1-1-1986

Emotion-scanning therapy : an integrative use of biofeedback and cognitive therapy in pain management.

Nancy J. Erskine
University of Massachusetts Amherst

EMOTION-SCANNING THERAPY: AN INTEGRATIVE USE OF BIOFEEDBACK AND COGNITIVE THERAPY IN PAIN MANAGEMENT

A Dissertation Presented

By

NANCY JANE ERSKINE

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

February, 1986

Department of Psychology

EMOTION-SCANNING THERAPY:
AN INTEGRATIVE USE OF BIOFEEDBACK AND
COGNITIVE THERAPY IN PAIN MANAGEMENT

A Dissertation Presented
By

NANCY JANE ERSKINE

Approved as to style and content by:

Seymour Epstein, Chairperson of Committee

Morton Harmatz, Member

Ronnie Janoff-Bulman, Member

D. Nico Spinelli, Member

Seymour Berger, Department Head
Department of Psychology

ACKNOWLEDGEMENTS

In embarking upon the pursuit of a graduate degree it is important to have access to people who represent the forerunners in one's field of study. I had such access in the form of my major professor, Dr. Seymour Epstein. Sy's knowledge of psychology, his insight into psychological concepts, his capacity to communicate effectively, and his demand that his students work as hard as he does have helped tremendously in my growth as a psychologist. I am fortunate to have had the opportunity to study and work with Sy Epstein and would like to thank him sincerely for his help and guidance over the years.

I would also like to thank the members of my committee, Drs. Mort Harmatz, Ronnie Janoff-Bulman, and Nico Spinelli. They helped me to streamline my dissertation inquiries in such a way that I was able to develop a set of questionnaires which proved to be relevant and analyzable for both my present dissertation as well as future research and clinical endeavors.

A special word of thanks goes to Dr. Nico Spinelli. Nico has spent innumerable hours with me discussing the implications of my work for the field of medicine, and has proven to be an invaluable source of information in regard to the use of computers in research and clinical practice.

I would also like to acknowledge and thank my family. Electra Complex notwithstanding, I simply have the best dad in the world, and he is married to a most wonderful woman that I am privileged to call mother. A very special place in my heart goes to my sister and brother-in-law, Lis and Franco. Throughout the past years they have provided unwavering counsel -- not to mention room and board on numerous occasions! And finally, I'd like to thank my brothers, Adam and Peter for all their love and support.

No, Damian, I didn't forget you. You are the reason for this and everything in my life. I thank you the most. For once it can truly be said that without my son, Damian, this dissertation would never have happened.

ABSTRACT

EMOTION-SCANNING THERAPY:
AN INTEGRATIVE USE OF BIOFEEDBACK AND
COGNITIVE THERAPY IN PAIN MANAGEMENT

(February, 1986)

Nancy Erskine, B.A., Indiana University

M.S., Kansas State Univeristy
Ph.D, University of Massachusetts

Directed by: Professor Seymour Epstein

A new approach to the treatment of psychosomatic pain syndromes is introduced and tested in the present paper. This method, termed Emotion-Scanning represents an integration of principles derived from biofeedback and cognitive therapy in the treatment of psychosomatic pain syndromes. The method of Emotion-Scanning constitutes a holistic approach to pain problems which gives equal weight to the somatic and psychic factors which contribute to the pain experience.

To test the effectiveness of Emotion-Scanning therapy, two groups of pain patients were employed. Both groups received identical forms of a comprehensive

biofeedback regimen consisting of frontalis electromyography and peripheral thermometry in conjunction with specific therapist-guided relaxation training. During the latter half of treatment, one group received training in Emotion-Scanning therapy in addition to their biofeedback therapy. The other group continued with biofeedback therapy and received contact time with the therapist to compensate for the added therapy being provided to the Emotion-Scanning group.

Both groups improved in respect to their daily emotionality and pain experiences, attesting to the benefits of a comprehensive course of biofeedback therapy. The Emotion-Scanning group showed greater improvement than the biofeedback group in regard to the experience of pain-related emotions, and were found to have significantly less pain as well. They also reported feeling significantly more competent, loveable, likeable, and integrated at the end of treatment.

A major conclusion arrived at in the present study is that Emotion-Scanning therapy helps individuals to cope more effectively with negative emotions. Patients who received Emotion-Scanning training learned to accept negative emotions as sources of information about themselves and the world, and as potentially healthy

motivators of human action. Thus, the experience of negative emotions became less threatening. This was manifested behaviorally in terms of a greater capacity for dealing with the issues underlying patients' daily emotions.

Emotion-Scanning therapy promises to be a dynamic new form of therapy which should prove to be of benefit to pain patients and patients suffering from other stress-related disorders.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

C H A P T E R I

INTRODUCTION

The advent of biofeedback therapy has done much to provide individuals with a means of alleviating pain and its associated distress (Brown, 1977; Ford, 1982). However, while the use of biofeedback modalities has gained widespread support in pain control, there remains the question of whether biofeedback should suffice as the sole therapy of choice in pain control, or whether it should be used in conjunction with other forms of therapy (Rickles, Onoda, and Doyle, 1982). An integrative (multi-modal) approach to pain control is of especial concern to investigators who view pain as the product of many determinants, including cognitive and emotional determinants, as well as physiological ones (Melzack and Wall, 1965, 1983; Melzack and Perry, 1975; Hartman and Ainsworth, 1980; Turk, Meichenbaum, and Genest, 1983).

The purpose of the present paper is to propose one such integrative approach which utilizes the self-study of emotions in conjunction with the self-study of physiological reactivity. In the following pages we will examine the paradigms associated with the two modes of

self-study and, while being cognizant of the differences, attempt to demonstrate the commonalities as well. By combining the two therapeutic modes of self-examination it is hoped that not only will the psychosomatic pain patient benefit by means of an efficient strategy for controlling pain and its associated distress, but that our theoretical understanding of pain and distress will be heightened by the present focus on the interactive nature of emotionality and physiological reactivity.

C H A P T E R II

THE NATURE OF PAIN AND EMOTION

VIEWS ON PAIN

2.1 INTRODUCTION

Two therapeutic approaches were combined in the present study. These methods were derived from a careful study and review of the goals inherent in Cognitive and Biofeedback therapy. Before we examine the approaches to be combined in this study, let us explore what is meant by the terms "emotion" and "pain". These are highly difficult terms to define, for while we all know that we experience both emotion and pain, the specific functions which are called into play and which culminate in one or the other experience are highly complex. They do not lend themselves to simplistic descriptions which allow us to verbally distinguish one from the other such that we could say, for instance, that pain is a physiological response and emotion is an affective one. Such descriptions are meaningless once we acknowledge that all of our

experiences are physiological in origin (simply because we are living, physiological organisms), and, as Sherrington (1900) has stated, the "mind rarely, probably never, perceives any object with absolute indifference, that is, without 'feeling'...affective tone is an attribute of all sensation" (p. 974) including pain.

Our attempt to define the terms is further complicated by the fact that the experiences lend themselves to different fields of study which often fail to be interdisciplinary in nature. That is, pain is a subject of intrinsic interest to neurophysiologists, while emotion as a subject of inquiry finds a natural home among psychiatrists and psychologists. In consequence, the physiological language of pain is often difficult to interpret in psychological ways, while the psychological language of emotion is not easily translatable into patterns of physiological response.

2.2 HISTORICAL PERSPECTIVE.

During the 19th century, pain was viewed as an "affective quale -- the opposite of pleasure -- rather than a sensation, and emphasized the unpleasant affect (or

'feeling') that forces the organism into action" (Melzack and Casey, 1968, p. 423). However, the theoretical treatment of pain as a psychological variable with a focus on the roles of affective and motivational processes began to be overshadowed by the developments in sensory physiology and psychophysics made in the 20th century. "Pain" became a sensation, much like vision and hearing, which specificity theorists believed could best be understood in terms of directly communicated neural impulses originating at "pain receptors" and travelling to a "pain center" in the brain (Sweet, 1959).

The psychological aspect of pain was relegated to the investigations of psychophysicists who devoted themselves to formulating psychophysical laws that would relate the physical intensity of external stimuli to internally perceived (psychological) intensity. In this way the psychological aspect of pain was confined to the perception of stimuli. The experimental approach to the role of affect and motivation was to treat them as sources of error to be controlled for. Conceptually they were considered as "reactions" to pain sensation, rather than inherent parts of the pain process itself. As Melzack (1965, 1968) notes, however, the conceptual model of pain when it is treated as a primary sensation, with cognitive

and affective processes relegated to the secondary position of pain reactions, fails to account for even simple observations.

For example, Beecher (1959) has observed the phenomenon of soldiers who completely denied experiencing pain after having sustained extensive injuries, presumably because they were so overjoyed at having survived the battle at Anzio beachhead. Beecher interprets the phenomenon as meaning that the soldiers blocked only their reaction to pain, but not the pain sensation itself. He comments: "A badly injured patient who says he is having no wound-pain will still protest as vigorously as a normal individual at an inept venipuncture (injection). It seems unlikely, therefore, that the freedom from pain of these men is not to be explained in the basis of any general decrease of pain sensibility" (Beecher, 1946).

If this is the case, however, we are faced with the uncomfortable paradox of describing nonpainful pain (Melzack, et al., 1968). Bettleheim (1979) has also noted the denial of pain among victims of concentration camps who were able to so depersonalize their abusive treatment that they could endure what should have been tremendously painful without experiencing it as such. Even Pavlov's dogs have demonstrated the inadequacy of the

pain-as-sensation model. Pavlov (1927, 1928) found that dogs who received gradual increments in the intensity of electric shocks, burns, or cuts, followed consistently by the receipt of food, eventually responded to the stimuli as signals for food and failed to show any signs of feeling pain.

Rather than attempting to explain "nonpainful pain" by switching from a physiological description of pain sensation to a psychological description of pain blocking after the fact, it seems more reasonable to assume that the input was blocked by cognitive and emotional activities before it could evoke subsequent cognitive and affective processes further upstream (Melzack and Wall, 1965).

2.3 A CURRENT VIEW ON PAIN

An important step forward in the understanding of pain was offered by Melzack and Wall (1965) in their proposal of the gate control theory of pain. While the theory itself relies heavily on the physiological evidence underlying pain experiences, it provides a critically needed basis for consideration of the cognitive and

affective dimensions of pain in addition to the more easily recognizable sensory aspects.

The model is highly complex and will only be briefly presented here. (The reader is referred to Melzack's and Wall's 1965 publication of the theory in "Science" for elaboration of the specific neurophysiological mechanisms involved.) For our purposes what is important to understand is the suggestion that afferent activity (i.e., neural activity travelling toward the brain such as occurs in the transmission of external information to central processing) is modified in the spinal cord by efferent activity (i.e., neural impulses travelling away from the CNS) originating in both the spinal cord itself (reflex withdrawal) and the cortical and limbic structures of the brain. It is the presence of these spinal mechanisms that constitute the 'gate control' system.

Wall states:

> It is now useful to restrict the term 'gate control' to the rapidly acting mechanisms that receive and control the transfer of impulses from the input afferents to cells that in turn trigger the various effector systems and that evoke sensation (1984).

There are three primary components that make up the gate control system: sensory afferents, segmental cells, and descending controls. Sensory afferents include the

nociceptive afferents as well as mechanoreceptors. Segmental cells reside in the CNS and serve to "select and compute combinations of the signals that terminate on them. Some combinations sum and aid each other whereas others evoke inhibitions by way of interneurons" (ibid). Descending controls, as the term implies, are composed of higher level inputs which innervate the laminae of the dorsal horn of the spinal cord, and influences the activity therein.[1] Descending controls serve to both inhibit and excite afferent activity. For example, inhibitory effects of low threshold afferents may promote excitatory effects of high threshold afferents. In this case, an inhibitory surround appears to get created which restricts the spatial and temporal distribution of responses to intense stimuli.

In addition to the immediate effects of descending

[1] The dorsal horn is made up of six liminae and it is within these laminae that the pertinent interneuronal connections of the gate control exist. High threshold, small diameter nociceptors reside primarily on the marginal layer of the dorsal horn, whereas low threshold, large diameter mechanoreceptors terminate primarily in the deeper laminae. Segmental cells interconnect with one another and interconnect the various laminae. Wall states the influence of segmental cells to be the following: "Each lamina receives the information computed by the cells dorsal to it. In this way, the origin of the cell's input, its receptive field, becomes more and more complex and subtle in more and more ventral laminae" (1984).

controls on afferent activity, Wall also addresses long-term changes in neuronal activity, which is referred to as connectivity control.

He states:

> Signs of prolonged changes are immediately apparent in the cells in the most dorsal part of the dorsal horn. The cells of laminae 1 and 2 exhibit the classical brief and rapid responses to arriving volleys, but they also show prolonged effects. Some respond over many seconds or minutes following a brief stimulus. Others show a striking habituation in which they respond only to the first members of a train of repeated stimuli and remain silent for minutes after their prelimminary responses. A high proportion of these cells show an instability of their receptive fields, so that repeated testing at five minute intervals shows a variation of size, shape, and location, which we have called amoeboid receptive fields (Wall, 1984).

Wall confines his evidence in support of prolonged changes within the CNS to observed changes as a result of actual damage to peripheral or central nerves. The important point here is that injuries can produce widespread changes in terms of the neural activity of other areas of the body. Thus nerve impulses from normal nerves can be processed in an abnormal fashion by changed central structures.

The gate control (and more recently, the connectivity

control) theory of pain experience addresses specific interactional effects within the dorsal horn of the spinal cord that influences the kind of neural impulses reaching the brain. Explicit in these theories of a gate control and connectivity control system is the belief that pain is the joint product of spinal dorsal horn receipt of (peripheral) sensation and (central) cortical activity which include cognitive, affective and motivational inputs to experience. It is, in other words, a dynamic theory of pain which emphasizes the interactive nature of experience rather than confining itself to a consideration of the sequence of components going into an experience.

VIEWS ON EMOTION

2.4 HISTORICAL PERSPECTIVE

The construct of emotion, like pain, has been approached from a number of perspectives. Much research has been devoted to 1) the evolutionary significance of emotion in enhancing survival, 2) the feeling components of emotion wherein the experience of emotion is thought to be equivalent to the bodily changes which transpire in

response to an event, and 3) the action-oriented bases of emotion wherein emotion is thought to set up a predisposition to patterns of response which establish physiological "readiness". Finally, a number of theorists have currently begun to focus on emotion as the composite of a number of factors with special emphasis given to the kinds of construals which set the process in motion. Let us consider each of these perspectives in turn.

2.5 The evolutionary perspective on emotion.

Much of the theorizing about emotions, which is not only explicity incorporated in the present discussion of evolutionary perspectives, but is implicit in the other perspectives to be addressed shortly, has been influenced by the work of Darwin. According to Darwin, behaviors which are manifest among and across species can best be understood in terms of their survival value. Behaviors which have survival value tend to be preserved across generations because those behaviors increase the likelihood that the organism will survive long enough to reproduce, thereby genetically passing on the survival enhancing instinct or predisposition to progeny.

Two components of Darwin's theory are particularly relevant to an understanding of emotion. First, in order to survive, an organism must have at its disposal a means of quickly reacting to the stimulus at hand, that is, an action component of reactivity. Second, it is of survival benefit to have an expressive component of reaction, such that the behavior engaged in can increase the likelihood of specific kinds of reactions on the part of other responding organisms. For example, if in danger of attack, it is of survival value to have a response which not only quickly mobilizes the organism for appropriate action, but one which can inhibit the attack response in others; e.g., by appearing larger or more dangerous than is actually the case.

While Darwin was concerned with both aspects of survival (i.e., that of setting up appropriate action-tendencies within the organism, and that of setting up communicative, or expressive-tendencies geared to affecting the behavior of others), in his explicit writings on emotion he tended to focus primarily on the expressive component. Much of his writing emphasizes the commonalities extant across species in the manifest expression of emotion (Darwin, 1965). For instance, the baring of teeth to communicate a threat of attack has been

observed across a large number of species, including man. Included in his observations of manifest emotion are descriptions of bodily expression as well, as in, for example, the expansion of torso muscles and the flaring out of hair, feathers, or scales (depending on the species) which add to the effect of largeness.

Following Darwin's lead, a number of researchers have focused on the expressive components of human emotion. Usually the research has centered around facial expressions (e.g., Izard, 1977; Ekman and Friesen, 1975), although attention has been given as well to bodily expressions of emotion. The research done on the expressive component of emotions has done much to further our understanding of the continuity of emotion across human and non-human lines. It has emphasized, as well, the social significance of expression in that the function of expression is not only to set up a disposition to act within the organism, but to influence the actions of others in the vicinity (Izard, 1977).

The difficulties with this approach lie in the following considerations: First, the continuity of "pure" emotional expression as we move down the phylogenetic ladder, is not as clear-cut as might at first appear. Most of the research which has devoted itself to the

expression of emotion and pointed to the evolutionary significance of such expression has confined itself to the investigation of higher primates. When similarities across primate and non-primate species are pointed out, the focus normally shifts to comparisons between dogs or cats and the higher level organisms. It is difficult to sort out, however, how much similarity actually exists and how much our perceptions are swayed by our affection for these creatures that we treat as 'members of the family'.

For example, when a dog attacks an intruder to protect his master, is he feeling 'anger' for the intruder? My son's puppy is in a stage of development wherein he viciously barks and attacks my curtains. Is the puppy 'angry' at the curtains, is he playing (which would suggest that he is 'happy' not 'angry'), or is the puppy blindly responding to some baser instinct built into his system which might be more properly defined in terms of developmental preparedness without reference to emotion.

Further, a question arises as to the phylogenetic point at which we stop talking about emotions and confine ourselves to discussions of 'survival value'. When an opposum "plays dead", is the animal angry or frightened? What emotion is manifested by a flounder when it changes

color? Among these animals at least, (and it can be argued that the point holds for higher level organisms as well), the expressive behavior observed has little in common with "emotion" as we normally use the word.

Finally, as we move to a consideration of human emotion (and particularly adult human emotion), the investigation of emotional expression is complicated by the degree to which learning overshadows instinct. Humans are capable of both suppressing emotional expression (thereby appearing to be passive, for instance, when in fact they are not), and are capable of expressing emotions they do not in fact feel (for example, by appearing to be sorrowful when they are not). Further, in the "reading" of emotion in others (which, it will be recalled, is an important function of expression), humans are likely to unwittingly 'project' their own feelings onto others such that they are often more likely to perceive their own emotions in others rather than what is actually being communicated. What this means is that the manifest expression of emotion in humans is too complicated by other factors to serve as an unequivocal index of emotional experience.

2.5.1 The Physiological Basis of Emotion

William James (1890) was one of the first researchers to emphasize the physiological foundation of emotional experience. Prior to James, the usual way of thinking about emotions was to presume that an individual perceives an event which gives rise to a "feeling" (i.e., an emotion), which is then followed by various bodily changes which support the feeling. According to James, this particular sequence of events is incorrect. Instead, James proposed that the bodily changes which take place are a direct consequence of perception of the event that has transpired and that the feeling of such changes 'is' the emotion. He stated -- "Common-sense says, we lose our fortune, are sorry and weep; we meet a bear, are frightened and run; we are insulted by a rival, are angry and strike. The hypothesis here to be defended says that this order of sequence is incorrect...that the more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble, and not that we cry, strike, or tremble, because we are sorry, angry, or fearful, as the case may be" (James, 1890, pp. 449-450).

The inevitable deduction derived from James' view is

that if an emotion is based on the experience of physiological states, then there must be different patterns of arousal to account for each emotion. At the time of this proposal by James, there were two problems inherent in the deduction. First, no one had demonstrated specific patterns of physiological activity in conjuction with the variety of emotions experienced by animals and humans alike. Second, even if such patterns did exist, the theory still did not address the process by which such patterns come into play.

Schachter and Singer (1962) attempted to overcome these problems by suggesting that, since autonomic arousal appears to be activated in a diffuse manner, the subjective quality of emotional experience, while intimately tied to arousal states, is derived from the interpretations that individuals make in response to their environment. Thus, while the experience of emotion is still thought to be concomitant with physiological arousal, their attempt to define the specific quality of the emotional states emphasized the role of cognition. The suggestion that cognition plays a role in what emotions are experienced by individuals is an important contribution. Unfortunately, the importance of this contribution was quickly overshadowed by other problems

inherent in their theory. First, a number of researchers have pointed out that individuals are normally quite unaware of the physiological feeling component of emotion (see, for instance, Jacobson, 1974), thereby bringing into question the degree to which peripheral bodily changes instigate the need for cognitive evaluations. (Later, it will be seen that Cannon, 1929, had also emphasized this point.)

A second point of contention which is more subtle, but no less important, is the suggestion by Schachter and Singer that emotional experience proceeds in a sequential fashion from an autonomic arousal/feeling state to an interpretation of the circumstances within which the arousal is experienced to a subjective labeling of the emotion. Just as we saw in Melzack's evaluation of pain experiences, the evaluation of a complex construct such as emotion cannot be completely supported by such sequential models.

It will be recalled that researchers who adhere to sequential models of pain-as-sensation fall into the uncomfortable paradox of attempting to explain nonpainful pain. The same kind of paradox (i.e., that of explaining nonemotional emotion) befalls researchers who adhere to a sequential model of emotion. A simple example in this

regard can be found in the literature on grief in which there are ample descriptions of individuals who manifest a substantial amount of physiological arousal and who accurately interpret the circumstances as loss of a loved one, but who nevertheless report a complete absence of emotion (see Parkes, 1972, and Marris, 1974, on shock stages of bereavement).

2.5.2 Action-Oriented Perspectives on Emotion

In contrast to a view that emphasizes the role of physiologically induced feeling states in producing emotions, Cannon (1927) presented an alternative view which stressed the action component of emotional response. Because Cannon's views on emotion have played a major role in the rationale underlying biofeedback therapy, let us consider his contributions in some depth. Cannon's theory grew out of a desire on his part to test out the ideas presented by James (1890) and Lange, who had independently arrived at the same conclusion, that emotion is the awareness of physiological changes resulting from perception of a situation. Cannon contested the James-Lange theory, as it came to be called, based on the

following facts:

1) Sherrington (1900) and Cannon (1927) showed experimentally that the ablation of visceral and sympathetic feedback to the brain did not prevent their experimental animals from exhibiting typical reactions of anger, fear, and pleasure.

2) Cannon pointed out that a variety of stressful stimuli tend to produce the same kind of physiological reaction. For example, fear and rage tend to produce the same kind of visceral changes as is witnessed in fever states and as is produced by exposure to cold and decreases in oxygen. As Cannon points out, not only are many physiological reactions too diffuse to allow us to distinguish between various emotions, but their generalized quality does not even allow us to distinguish between emotional states and other stressors which are more properly defined in non-emotional terms.

3) In relation to his first criticism, Cannon points out that the viscera are relatively insensitive structures when it comes to responding to such forms of stimulation as cutting, burning, tearing, etc., thereby bringing into question the degree to which visceral stimulation could evoke a recognition of specific emotional states.

4) Despite the information provided by visceral

stimulation, the time required for neural impulses to travel from visceral sites of stimulation to cortical areas of excitation is too slow to warrent postulating a physiological to cognitive sequential basis of emotion.

5) Finally, Cannon pointed out that experimentally-induced changes in visceral activity does not necessarily produce emotional reactions. Thus, for example, while injections of adrenalin is bound to produce substantial physiological reactivity, such reactivity does not invariably result in the emotion of fear.

The extent to which Cannon's objections to the James-Lange theory are valid can be questioned. The James-Lange theory essentially refers to the feeling component of emotions, which is stated to be based on physiological states. Physiological states represent a broad spectrum of human reaction, and was not confined by James to the visceral or autonomic activity referred to by Cannon. Nevertheless, the importance of Cannon's work lies in the alternative theory which he developed and the implications of this theory for the way current researchers are likely to conceptualize the relationship between bodily and psychic events.

According to Cannon, the thalamus is central to emotional experience. The thalamus is innervated by both

sensory and cortical neurons. In turn, thalamic neurons innervate muscles and viscera, as well as the cortex by direct connection and by irradiation (Cannon, 1927). Cannon's work was expanded upon by Bard (1928), who found that "sham rage", which is induced in cats by decortication, is abolished by extirpation of the thalamus, thereby suggesting this area to be essential for the expression of emotional behavior in addition to its felt experience and associated bodily changes.

Beyond Cannon's explicit exposition of brain structures involved in emotion, what was especially appealing about his theory was his reinterpretation of the significance of peripheral changes in physiology (Cannon, 1929). Rather than supposing that the awareness of peripheral physiological changes is the emotion, as suggested by James, he pointed out that bodily experiences associated with acute emotion represent the by-product of sympathetic nervous system activity which is activated at times of "flight or fight" responses. Conversely, the parasympathetic nervous system, he suggests, functions to conserve and store bodily reserves, thereby preparing the body for optimal reaction to stress on later occasions.

2.5.3 Implications for Understanding Psychosomatization

The importance of Cannon's theory of emotion is two-fold. First, it is a theory of adaptive response, which transcends the mainly definitional approach taken by James. Second, it has important implications for the understanding of psychosomatic illness. One can readily see how an adaptive response that would prepare one for fighting or fleeing from a momentary adversary can become maladaptive when the response is activated and prolonged beyond its usefulness, or even in the absence of any real threat.

One of the signposts of human evolution points to our capacity for over-reacting to things which exist only in the "mind's eye." Often, what is threatening to a human does not constitute a danger to life or limb, but rather constitutes a danger to one's beliefs about onself, or the world (Freud, 1959; Parkes, 1975; Epstein, 1976). In consequence, through cognitive re-activiation of arousing events, humans are often activiating the flight-fight response in the absence of real danger, and/or prolonging autonomic nervous system activity beyond the point that real danger persists. As Selye (1956, 1976) notes, if the autonomic nervous system is continually over-reacting, the

result could be causally related to the onset of some psychosomatic disorder.

In line with this thinking, there are three pathways available to therapists interested in treating psychosomatic illness. One way is to teach individuals how to obtain control over their autonomic nervous system reactivity. Prior to the advent of biofeedback techniques, such an approach was deemed to be unrealistic for, as the name "autonomic" suggests, such responses were thought to occur outside the control of individuals. Another way is to treat the psychological responses that mediate psychosomatic illness. This is, of course, the preferred avenue among psychotherapists who view the psyche as the critical element involved and who, following the tradition of psychoanalysis, attempt to trace the propensity for maladaptive responses back to its psychic origins . The third way is to treat the physiological manifestations of psychosomatic illness with medication or surgery, the preferred method of treatment among medical practitioners who are primarily concerned with the sensation of pain experienced by the individual and who might know little of its psychological genesis.

Once it became apparent that through the process of mechanically feeding back to an individual analog

information related to his physiological activity that the individual could learn to control his physiological response, a whole new meaning was given to Cannon's theory. Not only could we understand the onset of psychosomatic illness through the analogy derived from the flight-fight response theory, but we could provide a means of therapeutic intervention wherein the individual could be taught to control autonomic arousal activity (thereby negating its ailment effects and obviating the need for further intervention).

Since that time, researchers have pointed out that the one-sided view that autonomic nervous discharge is 'bad' and reduced arousal 'good' is simplistic and not borne out by the facts (Stoyva, 1976; Holroyd and Appel, in print). Nevertheless, the result was that in the early days of biofeedback a great deal of research was devoted to defining and specifying the parameters of self-control and was aimed at reducing arousal states associated with a number of disorders. What was forgotten or neglected by many researchers in biofeedback was the role of input of psychological activity in the manifestation of psychosomatic ailments. Hence, beyond generalized relaxation procedures (geared toward the indirect control of autonomic nervous system activity), and the feedback of

specific physiological indices of autonomic nervous system activity as well as pertinent skeletal muscle control, the exploration into more specific 'psychic' influences has been pretty much neglected.

It is as if, in our enthusiasm for control over heretofore uncontrollable features of human reactivity, we have forgotten the other feature of human response -- namely, that humans Think. Our physiological responses (be they autonomic or otherwise) are not merely the product of instinctively-induced reactions to danger, but are also a product of cognitively-induced appraisals. It is, in fact, the cognitive dimension of fight-flight responses which serves as a foundation for the onset of psychosomatic ailment. That is, the organism is perceived to have an essentially adaptive form of physiological response which becomes maladaptive due to its utilization in non-dangerous situations. As Epstein (1982) has noted, the danger that humans normally encounter is related to a threat to the self-concept rather than a threat to life or limb.

2.6 CURRENT VIEWS ON EMOTION

From the foregoing discussions it is perhaps apparent that cognition plays an implicit role in both the James-Lange and the Cannon-Bard theories of emotion. In the first case, the rudimentary cognitive process of perception is implicated in the receipt of external stimuli and the emotion is presumed to consist of the physiological changes that ensue. Schacter and Singer later elaborated on the role of cognitive processes by suggesting that it is the interpretation of the surrounds within which the diffuse physiological changes are occurring that provides the particular quality of various emotions. In the second case, basing his work on Cannon's theory, Seyle implicated cognitive processes in emotions, and particularly in stress disorders, by pointing to the intensification and prolongation of autonomic arousal as a result of maladaptive appraisals of danger.

Thus, the suggestion that cognitive processes play a role in emotional reactivity is not new. However, the central focus which has been given to cognitive processes by more recent theorists is. Further, the theorists we will be dealing with have taken a more comprehensive view of emotion and its implications for physical and mental

health. The comprehensiveness of the views inherent in the recent theories of emotion with a cognitive orientation can be seen in the two following definitions provided by Lazarus and Epstein.

According to Lazarus "Emotions are complex, organized states (analogous to, not the same as, syndromes [see Lazarus et al., 1970]) consisting of cognitive appraisals, action impulses, and patterned somatic reactions. Each emotion quality (e.g., anger, anxiety, joy) is distinguished by a different pattern of components, which is what urges the analogy to a syndrome. Moreover, the three components of emotion are subjectively experienced as a whole, that is, as a single phenomenon as opposed to the separate and distinct responses. When one component is missing from the perception the experience is not a proper emotion although it may contain some of the elements" (1980, p.198).

According to Epstein (1982) a primary emotion can be defined as "a complex physiological and behavioral response pattern that is common to higher order animals, including humans, and that is associated with a specific action tendency, a specific state of receptivity to stimulation, a specific pattern of physiological arousal that is supportive of the other states, and often with a

specific pattern of expressive behavior" (p. 18). In addition, Epstein has made note in personal communications with the present author that a comprehensive definition of emotion should also include its affective or feeling component.

The inclusion of a feeling component in the definition is important because it distinguishes affect from emotion by noting that the former is a component of the later. Healy, Bronner and Bowers suggest, affect is "a feeling tone, a pain-pleasure accompaniment of an idea or mental representation. It is not the same as emotion; for example the emotion of rage may be either painful or pleasurable" (1930, p.132).

Epstein notes that while he does not explicitly refer to cognition in his definition, he nevertheless regards cognition as "intimately associated with human primary emotions, and even, very likely, in rudimemtary form, with animal emotions." He notes further -- "The extent to which cognition is involved in emotion depends on one's definition of cognition. If it is assumed that cognition can be inferred from the existence of complex integrated behavioral tendencies that are flexibly adapted to situational demands, then the existence of cognition in emotion is implicit in my concept of emotion as a complex,

flexibly organized action tendency" (p. 100). On the other hand, "Averill defines emotion as a syndrome consisting of behavioral, cognitive, and autonomic components, no one of which is essential" (p. 99).

Whether or not cognition should be considered as an inherent part of emotion as suggested by Lazarus, as a non-essential part of emotion as suggested by Averill, or as a mediating reaction that instigates emotion as suggested by Epstein, constitutes an ongoing debate. What is important for the present purposes is to note the importance of cognition in present day attempts to understand emotion.

In the above definitions it can be seen that attention has been paid to all of the facets of emotion which were emphasized by Darwin, James, and Cannon; e.g., the expressive components stressed by Darwin, the physiological basis of emotion addressed by James, and the adaptive quality of the response emphasized by Cannon.

In addition, the above theorists have provided a framework within which to better understand and approach the phenomenon of emotional experiences in clinical work. For example, Lazarus states that individuals experience stress when they perceive a discrepancy between externally and/or internally imposed demands and the resources

available for meeting those demands. From Lazarus' perspective, cognitive processes or "appraisals" play an important role in both the initiation of a stress reaction (i.e. in the appraisal of demands) as well as in the initiation of action-tendencies (i.e., in the appraisal of coping strategies).

It should be noted that he makes no assumptions regarding the consciousness of such appraisals, and states that "Cognitions remain an inferential variable, and there are limits to the certainty with which we can determine the particular cognitions a person is experiencing" (Coyne and Lazarus, in print, p.16). Nevertheless, by focusing attention on certain categories of reaction (e.g., in determining whether the initial or "primary" appraisal is one of threat or challenge), as well as on certain categories of coping strategies (e.g., in determining whether the "secondary" appraisal is geared toward direct action or intellectualization), he suggests a theoretical framework which has obvious implications for therapeutic intervention.

Epstein also has provided an elaborate theoretical framework within which to better understand and approach emotional reactions from both a research and clinical perspective. According to Epstein, individuals formulate

implicit theories of reality that consist of sub-theories related to both "self" and "world". He postulates three functions served by a personal theory of reality -- to maintain a favorable pleasure-pain balance, to assimilate the data of experience into a coherent conceptual system, and to optimize the level of self-esteem. Individuals experience stress, or anxiety, when they are confronted with information that threatens their self or world assumptions. The fundamental assumptions that individuals carry with them serve as a critical element in understanding the manner in which persons cope with stress.

As an example, behaviors which can be accurately diagnosed as maladaptive from another's perspective, can also be understood as a necessary means for the individual in question of maintaining the integrity of his or her personal theory of reality. Justice cannot be done to the elaborateness of this theory in the present discussion and the reader is referred to the following papers for greater elaboration -- (Epstein, 1973, 1980; Epstein and Erskine, 1983). What is important at present is to understand how emotions and cognitive processes, or "construals" can be examined in order to provide a clearer understanding of why an individual is behaving as he or she is, and how we

can help the person to intervene via the newer, adaptive strategies employed in order to enhance physical and mental health. In the following chapter we will explore two different therapies -- biofeedback and cognitive therapy -- which are concerned with the physical and mental health of an individual. Following this, we will then present an integrative use of the two therapies in the form of what I have labelled as "Emotion Scanning".

C H A P T E R III

THE NATURE OF COGNITIVE AND BIOFEEDBACK THERAPY

COGNITIVE THERAPY

3.1 PRECONSCIOUS PROCESSING

Beck (1976) has noted the importance of evaluating the preconscious processing of events, (or, as he refers to them, the evaluation of "automatic thoughts"), in gaining a more precise knowledge of the emotions and events which influence an individual's physical and mental well-being. An incident which Beck reports will illustrate the meaning and complexity of preconscious processing. In his past work as a psychoanalyst he frequently taught his patients to freely associate by reporting everything that entered the mind without censorship. He states that his patients became quite adept at the technique but that in the course of his practice he began to suspect that certain kinds of ideation were not being reported. While there is no dearth of psychoanalytic literature suggesting such

omissions, Beck felt strongly that the omissions were not necessarily the result of resistance or defensiveness on the part of the patient. His suspicions became more founded in his dealing with one patient who was freely associating a great deal of hostility toward him. When, during a pause, Beck asked the patient what he was feeling, the patient stated that he felt very guilty. As Beck states:

> According to the conventional psychoanalytic model, there was a simple cause-and-effect relation between his hostility and guilt; that is, his hostility led directly to guilty feeling. There was no need, according to the theoretical scheme, to interpose any other links in the chain. But then the patient voluntered the information that, while he had been expressing anger-laden criticisms of (Beck), he had also had continual thoughts of a self-critical nature. He described two streams of thought occurring at about the same time -- one stream having to do with his hostility and criticisms, which he had expressed in free association, and another that he had not expressed. He then reported the other stream of thoughts -- 'I said the wrong thing... I shouldn't have said that... I'm wrong to criticize him... I'm bad... He won't like me... I'm bad... I have no excuse for being so mean'.

The above example demonstrates that the free association technique which was formulated by Freud as a means of bringing into consciousness unconsious thought processes, may be tapping into a much larger dimension of

experience than is normally suspected (see Epstein, 1982, on models of psychic functioning for elaboration on this point.). Here the patient was able to eventually bring into consciousness not one but two coherent streams of thought. In fact there are three levels of attention which can be pointed to -- 1) the hostilty which was verbally expressed during the free association, 2) the guilt-ladden evaluation which the patient made in regard to his own criticisms, and 3) a consciously imposed "behavioral set" which set the patient up for being a "good patient" by reporting his hostility, but simultaneously put him into conflict, for in order to be a "good" patient he had to be, in his mind at least, a "bad" person.

3.1.1 Features of Preconscious Processing

Beck goes on to note a number of features which reflect the quality of preconscious thought patterns. First, they tend to be fairly specific and discrete, rather than vague and unformulated thought patterns, which arise in a, more-or-less, telegraphic style. That is, rather than experiencing the self-communication as complete verbal sentences, the thoughts consisted of a few

essential words that provide meaning to the thought.

Second, he suggests that they tend to be relatively 'autonomous,' that is, that the patient makes little or no effort to initiate the thoughts (and, in fact, in more disturbed cases, patients find them difficult to "turn off").

Third, he suggests that the thoughts are generally accepted by patients as being plausible or reasonable, even though they may appear "strange" to someone else. He states, "...the patient often tended to believe the unrealistic thoughts even though he had decided during previous discussions that they were invalid. When he took time out to reflect on their validity or discussed their validity with me, he would conclude they were invalid. Yet, the next time that he had the same automatic thought, he would tend to accept it at face value."(pp.36-37).

Finally, he notes that many of the thoughts that are most powerful and repetitive tend to be highly reflective of the patient's own problem areas, as well as having shared characteristics with other patients having the same diagnosis. Thus, training individuals to become more aware of their "internal dialogue" (as Plato called it) becomes an important therapeutic tool. But how do we train individuals to do this?

One way is to use free association techniques, but to instruct individuals to note the internal reactions they are having to their verbalized associations, as Beck has done. In a sense, individuals are encouraged to focus on the construals of their construals, somewhat akin to Lazarus' primary and secondary appraisals, but set within the context of a stream of consciousness rather than within the context of reacting to a single event.

3.2 THE SELF STUDY OF EMOTIONS

Another way is through the study of emotions, as Epstein has done (1982). Epstein's technique has been to have a number of individuals record, on a daily basis, their most positive and negative emotion over the course of thirty days. Because his research interests have been geared toward understanding the ways in which individuals construe the events leading to their emotional experiences, he has had subjects focus on the peak of their emotions in reporting them.

Through the course of interviewing these subjects, I have found that whether an individual has truly found the "peak" of an emotion is less important than making sure

the individual has chosen a specific moment. He or she can then clearly define what was occcuring in the environment at that time and can enumerate more easily the automatic thoughts and images they conjured up in response. The rapidity with which such automatic thoughts occur is undoubtably one of the reasons why they so often remain on a preconscious level. Thus if one is interested in these construal processes, it is important to have subjects break down their larger emotional experiences into smaller, more discrete and manageable parts.

3.2.1 Therapeutic Implications

The method of having individuals focus on the peak of their emotional experiences has provided Epstein with a substantial amount of data related to the implicit and discrete cognitions preceding primary emotional experiences. In addition, subjects have communicated a number of benefits which they have derived from their participation in the study. These benefits have obvious therapeutic implications and therefore they are summarized here:

1) The process of attending to one's own emotionality

encourages persons to become more attuned to the patterns of their responsivity. Some persons discover that they are much happier than they had previously thought, and others find that they are more angry or sad than they had realized. Still others discover a surprising lack of emotional reaction. Subjects often express an appreciation in regard to their self-study for regardless of whether the finding is positive or negative, subjects usually emerge with a clearer perspective on their overall emotional responses.

2) Patterns of predominant emotional reaction have importance when viewed in conjunction with the underlying cognitions associated with them. As a subject becomes more aware of his/her own internally-produced messages, he/she may become aware of what Epstein has referred to as the fundamental postulates of his or her personal theory of reality. For example, one subject may become aware of a tendency to respond to criticisms with preconscious thoughts suggestive of rejection while another may find a tendency to respond with thoughts suggestive of control.

3) A distinction made between objective and subjective stimulus events has encouraged a number of subjects to assess their emotional reactivity in terms of its appropriateness. Appropriateness in this context is

defined in terms of two relevant aspects of the self-examination. The first aspect is concerned with the reality basis of the reaction, while the second aspect is concerned with the intensity of the reaction.

Awareness of the "subjective link" between external events and emotional response allows subjects to determine if they are responding to something which is, in fact, actually present (e.g., if one is truly being "attacked", "rejected", etc.). If they determine that they are misconstruing an event, they have the option of trying to change their distorting construals. If they determine that they are accurately interpreting an event, they have the option of adjusting their construals such that they do not over-react (or under-react) to the situation at hand.

The verbal and written comments made by subjects in regard to their evaluations of the research project has led to the conclusion that the process of recording discrete emotional experiences on a daily basis can prove to be of benefit to the individuals involved.

3.3 ANCILLARY TECHNIQUES

Other techniques which help an individual to become

aware of the preconscious link between events and emotions include the following procedures employed by Beck (1976):

1) Alternative Therapy: Alternative therapy consists of discussing with the patient alternative explanations for experience. In the case of a depressed patient, the patient may reveal a systematic negative bias in his/her interpretations. By considering other alternative explanations, Beck states that the patient is "enabled to recognize his bias and to substitute more accurate interpretations" (Beck, 1976, p.273).

The same technique holds for discussing with a patient alternative ways of dealing with problems or situations. By discussing alternative ways of dealing with problems the "patient finds solutions that he considered insoluble. He also realizes that options he had discarded may be viable and can lead him out of his dilemma" (Beck, 1976, p.273). While not specifically addressed by Beck, it would also be hoped that systematic expectations about oneself or the world would begin to get 'revealed'. As the patient recognizes his bias in this area he can opt for substituting more adaptive expectations; on occasion, ones he never even thought of.

2) Cognitive Rehearsal: The object here is to delineate the problems which deter a patient from carrying

out necessary tasks. The patient is instructed to imagine going through the steps involved in a specific activity, and to report any obstacles which are anticipated and the conflicts that are aroused in consequence. The conflicts, or blocks, then become the focus of the therapist/patient discussion.

3) Homework Assignments: There are many homework assignments in cognitive therapy. Many of the assignments are behavioral in nature. That is, the patient is required to engage in certain tasks that will enable him to put into practice his newly acquired "cognitions" gained in the office. Some of these tasks may be designed as a means of providing experiences which will help alter the patient's faulty beliefs about him or herself; e.g., by employing success therapy. Some of the tasks are written assignments which are designed to break through the "blind spots" in a patient's belief system. For example, a depressed patient may quickly forget all the pleasures and success experiences he encounters in a day, and remember only the negative experiences he has had. Thus, in this homework assignment the patient is instructed to keep a running account of his activities and to mark down "M" for each mastery experience and "P" for each pleasure experience.

The homework assignment which is of specific concern in the present discussion is the log of automatic thoughts which Beck requires of patients. In this log the patient writes down a negative cognition in one column and the rational response in another column. In using this log, a specific problem area has already been decided upon which is consistent with the patient's diagnosis. So, for instance, in a depressed patient some of the target areas may include inactivity, withdrawal, and avoidance. In the patient's log, he would be expected to write the negative cognition in column one and the rational response in column two (See Table 1 for an example).

Table 1

Patient's log of negative and rational cognitions

Negative Cognition	Rational Response
1. Too tired or weak	1. What lost by trying
2. Pointless to try	2. Has passivity been good?
3. Will feel bad if active	3. Will feel bad if passive
4. Will fail at anything	4. How do I know that if I refuse to try?

(Table adapted from Beck's "The Target Approach to Depression".)

A variation on the logging procedure can also be used when no target behavior has been specified. In this

procedure, the patient uses three columns. Column 1 is used to describe the eliciting event that produced the unpleasant feeling, column 2 the negative automatic thoughts, and column 3 the corrective response. Table 2 provides an example of this procedure based on an event recently reported in this office.

In all the above procedures, an attempt is made (some direct and some indirect) to help the patient identify his/her automatic thoughts. The most direct training involves having the person observe and make note of the sequence of external events and his or her spontaneous reaction to them. Sometimes the automatic thoughts are very conscious and easy to report, such as in the example provided in Table 2. Sometimes the automatic thoughts are not on the surface of an individual's awareness, and he/she has to be told to pay very close attention to the gap which exists between the occurrence of an event and the ensuing emotional response.

Table 2

Log of events, thoughts, and corrective responses

Eliciting Event	Automatic Thought	Correction
I honked my horn for a friend and a woman screamed at me to stop.	1.Who the hell does she think she is? 2.She can't talk to me like that!	1.She must have had a bad day to be so angry. 2.She can talk however she wants, but I don't have to respond.

3.4 RATIONAL EMOTIVE THERAPY

An approach which Ellis uses (1973) to explain this gap to a patient can be demonstrated in a procedure which he refers to as the "ABC" sequence. "A" is the "Activiating experience" and "C" is the upsetting emotional "Consequence". "B" is the gap, or "Belief" in the patient's mind. The "B" part of the sequence serves as the bridge between "A" and "C". Ellis explains to the patient that he or she wrongly believes that "A" (e.g., being rejected) causes "C" (e.g., depression). He avers that if this were the case, then everyone who has ever been rejected would feel depressed, but we know that is

not so. Therefore inbetween the activating experience and the emotional consequence, something else is taking place at "B", in the patients belief system. He then elaborates upon his system by making a distinction between rational beliefs (rB) and irrational beliefs (iB). A rational belief is one which 1) increases happiness and minimizes pain, and 2) is related to observable, empirically verifiable events. An irrational belief is one that "cannot be supported by any empirical evidence and is inappropriate to the reality that is occurring, or that may occur, at point A" (Ellis, 1973, p.57). To go further, Ellis states that Rational Beliefs result in Rational or Reasonable Consequences, and that Irrational Beliefs result in Irrational or Inappropriate Consequences.

Like Beck, Ellis has patients perform homework wherein they keep track of their emotionally upsetting experiences. Rather than using the 3-column method employed by Beck, however, the format of the log follows from his "ABC" assumptions of human psychology. Thus the person notes the "Activity, Action, or Agent" that was disturbing. He then notes both his Rational and Irrational Beliefs about the "A" portion of the log. From there, the patient records the rational and irrational

consequences of his respective rational and irrational beliefs. The method may also be extended to recording the "D" of the now "ABCD" sequence, which consitutes Disputing the irrational beliefs, and to recording the "E" of an "ABCDE" sequence wherein the individual makes note of the Effect of his disputing of the "B" and "C" portions of his protocol. These protocols can then become the material for office discussions. As Ellis states, "rational-emotive therapy largely employs direct philosophic confrontation " (1973, p.60), although like Beck, he uses behavioral techniques as well.

3.4.1 Regarding Philosophical Principles

A question arises however, as to whose philosophy we should use as a baseline for patient confrontation. While no single philosophy has emerged from cognitive therapies, there are a number of cognitive or "philosophical" principles which most therapists would agree with:

1) Following Horney's observations on the "tyranny of the shoulds", most would agree that individuals are better off if they avoid extreme "should" statements in their lives; (e.g., I "should" be financially successful";

he/she "should" love me, etc.).

2) Most would also agree that demands and commands are often a source of distress. While "should" statements are easily observed due the frequency with which we employ the word, demands and commands must often be inferred from an individual's comments. For example, a husband may not say "I demand that my wife have dinner on the table by 5 p.m." but he might say "I want my wife to have dinner on the table by 5 p.m." and the demand is inferred from the emphasis he places on the word "want", from the quality of his voice, the look in his eye, from the context of the communication, etc.

3) Another general principle concerns what Ellis refers to as "catastrophizing". Individuals may communicate to themselves and to others that various events are not only "unfortunate", but that they are "catastrophic". Whether the therapist prefers the word "catastrophizing" or refers to these communications as "alarmist" reactions , or over-reactions, the result for the individual is regrettably commonplace and the same. He or she creates great turmoil within him or herself, as well as in those in the environment, and usually arrives at little by way of discovering a solution to the problem.

4) Over-generalization is another tendency that

cognitive theorists would deem as problematic. For example, a student who has failed a test might conclude that not only did he/she not study hard enough, but that he/she is a stupid, worthless person who has no right to expect anything good out of life.

5) Another cognitive principle taken from Ellis includes not taking oneself too seriously. This principle is more or less a combination of catastrophizing and overgeneralizing. It is not meant to suggest that the individual, per se, is not important. The principle refers to the tendency of placing too much importance on tasks in our lives, on specific physical features of our bodies, on attributes of our personalities, and the like.

Thus, it is emphasized and hopefully comes to be accepted that it is 'okay' not to be perfect at every task, not to have a perfect body, and not to have a perfect personality. In fact, as Ellis would say, it is unreasonable and irrational not to believe otherwise.

6) A final principle that most cognitive theorists emphasize is that there is no inherent virtue in "suffering for the sake of suffering", and that feeling happy is a good and desirable state of being.

These principles, taken in part or in whole, do not necessarily stand at the forefront of a therapist's

approach to a patient. That is, the object of therapy is not to gain philosophical converts, but to deal with the patient as an individual with specific kinds of problems. Thus, the principles serve as a backdrop against which various modes of maladaptive behavior can be understood and addressed.

3.5 ASSUMPTIONS OF COGNITIVE THERAPY

The means by which any given principle may be addressed differs from one cognitive therapist to another, as is apparent from the number of techniques devised. Apart from varying approaches, the principles of cognitive therapy also serve as a backdrop for appreciating the assumptions of cognitive therapy, which consist of the following:

1) Underlying every emotion there is an implicit cognition.

2) Underlying maladaptive emotions are maladaptive cognitions.

3) Adaptive cognitions and corresponding maladaptive emotions cannot co-exist.

Given these assumptions, the main focus in cognitive

therapy is to pinpoint for a patient his/her distorting (maladaptive or irrational) cognitions and to teach the patient to substitute corrective (adaptive or rational) responses. A problem that arises in cognitive therapy is in getting patients to 'experience' adaptive cognitions. As Beck notes, a patient may acknowledge over and over again in a discussion with the therapist that a given cognition, or automatic thought, is maladaptive, but nevertheless continue to react to events with the same maladaptive thoughts and emotions outside the office. It is for this reason that cognitive therapists assign various at-home tasks to the patient; i.e., so that the patient can "try on" his new cognitions and begin to experience them on more than an intellectual level.

BIOFEEDBACK THERAPY

3.6 THERAPEUTIC CONCERNS

Like cognitive therapists,biofeedback therapists vary somewhat in specific emphases placed within biofeedback therapeutic regimens. There are, however, a number of components which appear to be common to all who utilize

this method of self-regulation. Initially there is a discussion with the patient regarding symptomatology and the reasons for coming to treatment. As in most therapeutic endeavors, including cognitive ones, a careful history is taken. In the case of psychosomatic pain, included in the history is an evaluation of the pain or stress experience. Often this phase of treatment is utilized as a screening device to determine if the patient is a good candidate for biofeedback therapy and should be conducted by medical personnel sophistocated in distinguishing stress related pain from pain of organic etiology (Erskine, 1983). For obvious medical, ethical and legal reasons, one would not want to rely solely on biofeedback techniques for the alleviation of pain or stress when the discomfort is the result of disease processes, such as brain tumors, or cancer.

3.7 TREATMENT REGIMEN

If the patient is an appropriate candidate for biofeedback therapy the regimen normally follows three phases:

1) Teaching the patient to be aware of specific

physiological reactions; e.g., muscular tension, peripheral vasoconstriction, heart rate, blood pressure, EEG activity, and the like, depending on the focus of the specific training to be employed.

2) Teaching the patient voluntary control over the physiological response by means of (a) feedback from the various systems attended to; (e.g., teaching the patient to lower the degree of muscular tension by means of electromyographic (EMG) feedback, or to gain voluntary control over peripheral vasoconstriction by means of periphal temperature feedback, etc.), and (b) teaching him/her relaxation, and mental imagery techniques that aid in the process.

3) Finally, the patient is taught to generalize the control of physiological reactivity to the natural (non-laboratory) environment. This consists of having the patient practice at home and combine his/her increased awareness of maladaptive physiological responses with his/her learned control over such reactivity when stress-producing events occur in daily life.

The above regimen follows naturally from the observations of Cannon (1927), Bard (1928) and Selye (1956), all of whom have pointed to the importance of autonomic and other physiological arousal states in the

production and maintenance of stress and pain. The term "stress" as it is often used in biofeedback literature refers to states of tension and arousal which only indirectly implicate emotion in the sense that stress states are "uncomfortable," or not affectively pleasing. Thus, while a relaxation, or non-stressed (i.e., untense, unaroused, affectively pleasing) state has played a major role in the biofeedback regimen, investigations of specific emotions have not.

3.7.1 Specific Techniques

In biofeedback, the strategies involved can be divided into three types: progressive relaxation, autogenic phrases, and guided imagery.

1. Progressive Relaxation -- This is a technique developed by Jacobson in 1929 aimed at achieving maximal relaxation of (striated) musculature in accordance with the therapeutic dictum that anxiety is incompatible with complete relaxation (and vice versa). Jacobson's rather extensive teaching procedures have been considerably shortened since the advent of biofeedback technology, and involve guiding the patient through varying degrees of

muscular contraction, followed by relaxation of the particular muscle group being addressed at the moment.

2. Autogenic Phrases -- These are phrases delivered by the therapist which amount to suggestions to the patient about his/her feeling state. The term "autogenic" is meant to refer to the fact that the patient is instructed to mentally repeat the phrases spoken by the therapist and to allow the suggested feelings to occur. Great emphasis in biofeedback therapy is given to the idea that neither the biomedical equipment nor the therapist can 'make' anything happen to the patient. Rather the patient is encouraged to take responsibility for his or her own "cure". The use of autogenic phrases is presumed to promote this responsibility. An example of autogenic phrases which might be delivered by a therapist is as follows:

I am beginning to feel quite relaxed. (pause)
My hands feel heavy and relaxed. (pause)
My wrists feel limp, heavy, and relaxed. (pause)
My breathing is slow and regular. (pause)

During the pauses between each phrase the patient mentally repeats the phrase that has been delivered. It should be noted that each phrase is delivered in the first person.

It is this form of delivery that distinguishes autogenic phrases from hypnotic suggestion.

3. Guided Imagery -- These are fantasied states, prompted by the therapist to re-create in patients feelings (especially of warmth) consonant with states of increased body heat (e.g., warm summer conditions, fireplace or campfire warmth sensations, etc.). Special emphasis is given to experiencing warmth in peripheral parts of the body (e.g., as in imagining warmth from the sun entering the body through the top of the head and travelling down into the hands and feet, or in imagining the warmth from a fireplace when holding one's hands in front of it). This technique is serviceable in the process of thermal training. It is designed to promote peripheral vasodilation, which is indicative of an allaying of sympathetic nervous system activity.

3.8 ASSUMPTIONS

The assumptions underlying biofeedback therapy are as follows:

1) Concomitant with every stress state is a physiological component.

2) Inordinate amounts of stress can lead to psychosomatic disorders.

3) Relaxation and stress cannot co-exist.

Given these assumptions, the main focus in biofeedback therapy is to pinpoint for the patient his/her maladaptive physiological responses, and to teach the patient to substitute corrective (adaptive or relaxed) responses. It is not normally a problem in biofeedback therapy to get the patient to 'experience' relaxation because the major portion of office time is devoted to this very point.

There is a problem, however, in getting patients to generally respond in a relaxed fashion throughout the course of daily life. As the Task Force on Biofeedback (1982) suggests, when a pain disorder is complicated by other factors such as family problems, financial problems, depression, interpersonal difficulties, etc., the efficacy of the treatment program is in serious jeapardy.

There is a certain irony in this suggestion, for on the one hand it is assumed that psychosomatic disorders are caused by stress. On the other hand, the same inordinate stress that caused the illness may prevent its

cure. What this means, of course, is that learning about one's bodily responses and learning relaxation may not be be enough to overcome a patient's problem.

Later it will be argued that by teaching patients to control their disruptive emotional reactions, not only through physical relaxation, but through forms of cognitive re-organization as done in cognitive therapy, the effects of biofeedback therapy should be enhanced.

This does not mean that cognitive therapy should replace biofeedback therapy. Biofeedback therapy has proven itself to be an effective form of treatment for a number of disorders. The present concern is with improving upon the technique rather than providing a substitute.

Let us examine some of the early work in biofeedback so we can see why it has gained acceptance as a legitimate means of treating psychomatic disorders. At the same time, let us remain cognizant of its limitations as a sole means of therapeutic intervention. As the Task Force Report on biofeedback (Rickles, Onoda, and Doyle, 1982) states -- "To assume that increased production of alpha band-width EEG rhythms, greater muscle relaxation, lowered blood pressure, or digital vasodilation will resolve all the psychological, social, and environmental antecedants

of a psychophysiological symptom is at best naive. For the most part, biofeedback is a treatment of the symptom rather than of the etiology or underlying cause... other modalities of treatment must be included with the biofeedback training to enhance its effectiveness" (p.2). What those other modalities should specifically consist of, however, has remained anyone's educated guess.

3.9 BIOFEEDBACK RESEARCH

In the following pages we will review some of the research which has been done on biofeedback and make note of the kinds of issues which have arisen.

An issue in biofeedback which is of no small concern is the relationship between a given physiological system and the experience of pain. This issue is important because it directly relates to one's conceptualization of the pain experience and this, in turn, will influence the methods of therapy employed. Thus, for instance, if pain is viewed as having a direct relationship with a discrete physiological system (such as muscle contraction headaches resulting from excessive constriction of the frontalis muscle), then the approach to pain relief would be to

teach control of the specific system involved. On the other hand, if the pain is believed to have an indirect relationship to a physiological system, (such as migraine headaches resulting from vascular dysfunction), then focusing control on a more diffuse system might be called for.

In both of these cases, it will be noted that the pain experience is conceptualized in terms of a pain-as-sensation model. While many therapists undoubtably take affective, motivational and cognitive influences into account in their approaches, systematic investigation of these components is lacking.

3.9.1 Early Research

A significant amount of biofeedback research has focused on the relationship between given symptoms and specific physiological systems. Take, for example, the investigation of muscle contraction (or "tension") headaches. As early as 1954, Sainbury and Gibson noted that patients with muscle contraction headaches demonstrated higher resting levels of frontalis electromyagraphic (EMG) activity than normals. This

finding was later extended by Budzynski and Stoyva (1969) who found a direct relationship between EMG activity of the frontalis and muscle contraction in other scalp and neck muscles. This led to a series of investigations directed at alleviating muscle contraction headache pain through the use of providing information on relevant muscles.

In the first study conducted by Budzinski, Stoyva, and Adler (1970), five patients were provided feedback information from their frontalis muscles by way of a tone whose frequency was proportional to the integrated muscle activity. Patients were instructed to keep this tone at the lowest frequency possible, but were not instructed as to how this might be done. The findings of the study showed a steady decline in headache activity consistant with lowered EMG activity over the course of training.

In a three month follow-up investigation, they found that muscle contraction headaches were eliminated in two patients, continued to be markedly reduced in a third, and for the remaining two patients returned shortly after the end of the biofeedback training. Thus, while strictly defined biofeedback training (i.e., biofeedback training in the absence of other strategies) was found to benefit three out of five patients, these initial results pointed

to the necessity of considering other factors in the process.

In 1973, Budzinski, Stoyva, Adler, and Mullaney conducted another investigation which they hoped would account for some of these other factors. In this study, subjects were divided into three groups: 1) an EMG biofeedback group, 2) a self-monitoring of headache intensity and duration group with no feedback, and 3) a yoked feedback group that was provided with signals produced by the true feedback group rather than with signals relating to their own activity. In both the true and yoked feedback groups, subjects were also instructed to practice the skills they acquired at home. Again, at the end of training as well as at a three month and eighteen month follow-up, subjects in the true biofeedback condition reported a significant reduction in headache activity, consistent with EMG activity, which was not evidenced by the self-monitoring and yoked feedback subjects.

3.9.2 Implications

There are a number of studies which provide support

for the utilization of feedback methodology in a number of pain disorders (see reviews by Nuechterlein and Holroyd, 1980, on tension headaches; Blanchard, Andrasik, Ahles, and Teders, 1980, on migraine headaches; Ford, 1982, on Raynaud's disease, esstential hypertension, and irritable bowel syndrome). Nevertheless, a number of problems arise, all of which are important in terms of the methodology applied, and all of which, as well, have implications for how we should conceptualize pain -- i.e., from a pain-as-sensation model, or from a more dynamic perspective in which pain is conceptualized as being composed of a number of components in addition to sensation.

First, there is the consideration of how direct the relationship is between a sensation of pain and the physiological system involved. In the experiences of muscle contraction headaches, it will be recalled that the studies of Sainsbury and Gibson (1954) as well as the studies conducted by Budzynski, et al., suggest a direct connection between sustained contraction of the frontalis muscle and the occurrence of tension headaches.

In this instance, it appears that we are dealing with a direct relationship between a striated (i.e., "voluntary") muscle and the experience of pain. Thus, it

would seem that not only can persons become more readily aware of the tension levels present (even without mechanical feedback), but can easily be made aware of the relationship between such tension and their experience of pain. Further, because striated muscles are normally under voluntary control, the patient should quickly and easily learn to abort the headaches by means of relaxing the relevant muscles involved.

Unfortunately, even with this sort of pain syndrome, the picture is more complicated than it at first appears. For one thing, Haynes, Griffin, Mooney and Parise (1975) have disputed Budzynski's finding that a direct relationship exists between the frontalis muscle and other parts of the head, neck, and shoulder muscles. Second, Epstein, Webster and Abel (1976), as well as Holroyd, Andrasik, and Westbrook (1977) have not found that changes in frontalis muscle activity suffice for accounting for changes in headache activity.

3.9.3 Problems of Generalization

These findings are all concerned, in part, with generalization procedures. In the Haynes, et al. study,

the degree of automatic generalization from one muscle to other muscle groups is contested. It is suggested that verbal instructions geared toward producing generalized, rather than specific relaxation of a given muscle should be incorporated in the biofeedback regimen. In the Epstein, et al. and Holroyd, et al. studies, the degree of generalization from in-office training to at-home utilization of the techniques is questioned, and the importance of stressing home practice as well as the employment of the technique during stress-producing events is indicated.[1]

The necessity for incorporating other strategies, beyond the mere mechanical feedback of physiological activity has received so much empirical support that the biofeedback Task Force Committee currently defines biofeedback therapy in the following way -- "This is a treatment procedure that involves allowing a patient/client to interact directly with a device that informs the patient/client of the moment-by-moment state of some bodily function. The patient/client uses this

[1] It is interesting to note that the two subjects in the 1970 Budzynski, et al. study who did not achieve relief from biofeedback techniques also reported that they did not practice the procedures at home.

information to bring about a change in the bodily function by some 'mental means' for the purpose of relieving suffering or averting pathophysiological dysfunction" (Rickles, Onoda, and Doyle, 1982, p.2; italics added).

For many, the "mental means" referred to above is interpreted as referring to the use of imagery and/or self-generated statements for the purpose of achieving relaxation, and a number of studies have compared the use of relaxation techniques used with and without feedback. In these studies, researchers have found that relaxation used without feedback produces significant reductions in reported pain which is comparable to the reduction in reported pain derived from relaxation with feedback.

A CHOICE BETWEEN COGNITIVE AND BIOFEEDBACK THERAPY

The above findings have led some (e.g., Holroyd, Andrasik, and Westbrook, 1977; Holroyd and Andrasik, 1978; Turk, Meichenbaum, and Genest, 1983) to suggest that biofeedback is not necessary in the treatment of pain, and that it is more cost-effective to forego the use of expensive biomedical equipment and concentrate instead on the cognitive factors which contribute to the alleviation of pain.

Without denigrating the importance of addressing cognitive factors in pain experiences, it is nevertheless important that we examine the basis for eliminating mechanical feedback from the therapeutic regimen. In regard to tension headaches, the Task Force reports: "The treatment package of relaxation plus frontalis EMG feedback plus autogenic phrases plus home practice plus charting is often enough to eliminate or reduce dramatically the frequency, duration, and intensity of tension headaches in many patients" (p. 18).

Given that frontalis EMG feedback constitutes only one of many components in the biofeedback regimen, can we therefore say that the mechanical aspect of the program is superfluous? Based on the kinds of studies that have been performed, and other kinds of considerations, we cannot.

For one thing, the kinds of studies which have compared biofeedback procedures with relaxation procedures alone have consistently found that while relaxation alone is comparable to the biofeedback procedures, it does not surpass it in effectiveness. Biofeedback becomes a baseline procedure against which other therapeutic modalities get compared. The Task Force states, "...the extant studies evaluate biofeedback as a treatment in and of itself, or biofeedback is compared to psychotherapy to

determine which is more effective, but not how it works as an adjunct" (p. 16).

Further, the simple mechanical feedback of physiological activity in the absence of other kinds of information is a procedure that would only be used in a laboratory setting -- that is, any therapist "worth his or her salt" is not going to attach a couple of electrodes to someone's forehead and walk out of the room without informing the individual of the rationale underlying the procedure, and how that individual can use this information in the alleviation of pain.

Finally, there are some conceptual issues which support the use of feedback procedures. First, and most important, is the concern with how we conceptualize pain -- particularly psychosomatic pain. As was argued in the begining of this paper, the experience of pain cannot be attributed to single cause-and-effect mechanisms. It makes as little sense to focus only on the cognitive aspects of pain as it does to focus only on the physiological aspects. Further, ignoring the physiological aspects of pain experiences can be as detrimental to the patient in the long-run as ignoring the psychological aspects. If it is true, as suggested by Epstein (1982), that there are specific physiological

concomitants to different expressive behaviors, then it makes sense to address such physiological concomitants, such as vascular reactions, directly.

In addition, one must consider the attitude of the patient (i.e., his/her expectations) upon entering a biofeedback regimen. In a recent symposium on biofeedback, I heard a number of psychologists and psychiatrists describe the psychological state of their patients upon entering the biofeedback regimen. These patients were described as feeling resentful, suspicious, and hopeless in their attempts to alleviate their pain. They were described as coming to biofeedback, regardless of whether they were self-referred or referred by their general practitioner, as a "last resort." They had gone through the gamut of pharmacological and surgical interventions, yet continued to experience pain and came to biofeedback primarily because they didn't know what else to do.

Patients, like physicians, tend to maintain a medical model of pain. When pain cannot be attributed to precise, organic etiologic factors, the result is that the physician often tends to feel resentful of the patient and helpless in regard to his/her own expertise. The patient, likewise, tends to feel resentful of health practictioners

and helpless in regard to his/her own experience of pain.

Turk (1980) states that referral comments on many of his patients describe them as "neurotic, hysteroid, a crank, a crock, or with the etiology of the pain attributed to G.O.K. (or God Only Knows), or even more demeaning, supratemporal disuse atrophy--that is, shrinkage of the brain because of disuse." These comments about patients reflect a general interpretation of psychosomatic disorders held by both lay persons and persons who should know better. That is, that the pain is "all in the mind" and therefore, doesn't exist -- yet the patient knows that the pain is quite real and naturally resents such meaningless psychological explanations.

For this reason, the mechanical feedback afforded by biomedical equipment is viewed to serve two additional purposes, one of which is educational and the other of which is a "placebo" (a term which, like psychosomatic has negative connotations, but can be viewed as an asset to therapeutic endeavors). In terms of its education function, the equipment can readily demonstrate to the patient how thoughts and feelings alter physiological functioning. This educational process, which normally requires only one session in biofeedback can take days, or weeks in other therapies not utilizing the equipment,

thereby bringing into question the statement that feedback is not "cost effective." The "placebo" effect of feedback equipment relates to the reassurance it provides the patient that the therapist is, indeed, taking his/her "physical" state seriously. As was indicated, this can have an important influence on the patient's attitude toward the therapy. In a very real sense, we might say that an electrode is worth a thousand words.

Future research needs to be conducted to determine if the educational and placebo effects of biofeedback instrumentation actually serve to enhance the outcome of treatment over the use of relaxation alone. For the present, the clinical implications of such effects warrant continued inclusion of biomedical equipment in the treatment of pain syndromes.

COGNITIVE THERAPY AS AN ADJUNCT TO BIOFEEDBACK THERAPY

In contrast to Turk's position that cognitive therapy can replace biofeedback therapy (1983), the present position is that cognitive therapy can enhance the already established effectiveness of biofeedback therapy. The use of one approach need not preclude the other. Therefore, rather than trying to pit one approach against the other

in order to determine which is "better," it is more productive to be eclectic and 'borrow' from cognitive therapy that which may be missing in biofeedback therapy.

It will be recalled that the primary reason for teaching a patient relaxation in biofeedback therapy is because the psychosomatic pain disorder is believed to be caused by stress. Obviously, stress (while defined in physiological terms) is not non-emotional stress. A ballet dancer puts much stress on her muscular and cardiovascular systems when she exercises. However, far from getting sick from the endeavor, she gets stronger and healthier. The stress of concern in biofeedback therapy is the stress associated with emotional upheaval. Teaching relaxation, then, is dealing with only part of the problem.

The other part of the problem concerns the emotional distress an individual is experiencing. While long-term psychotherapy is one approach to dealing with emotional distress, a more direct approach is needed because biofeedback is normally considered to be short-term therapy. Techniques used in cognitive therapy can supply the needed supplement without having to inordinately extend the number of treatment sessions.

Of course, it should be noted that in borrowing

techniques from cognitive therapy we are not providing a patient with a full course of cognitive therapy treatment. There is not the time available to engage in in-depth rational arguements, as Ellis does. Nor is there time to engage in appropriate in-depth probing, as Beck does. The question then becomes, how do we get a patient to recognize his or her maladaptive cognitions and to substitute more appropriate responses.

Educating the patient as to the presence of automatic thoughts and the important role they play in determining emotional reactions is important. Providing the patient with an appropriate homework assignment that focuses his/her attention on automatic thoughts that have occurred and requires him/her to discover corrective responses is also important. Beyond education and homework assignments, do we spend office time in discussing the patient's protocols, in discovering ways to get the patient to experience the advantages of adaptive ways of thinking, or what?

Of course, one does both. However, in the present study the main emphasis was on getting the patient to experience alternative ways of construing events and the respective emotional and physiological consequences.

Consider first, progressive relaxation. In this

relaxation technique one does not attempt to intellectually convince a patient that relaxation is good. One demonstrates that it 'feels' good by having the patient experience the difference between tensing and relaxing the various muscle groups. Next, consider the use of autogenic phrases. Here, again, the emphasis is on experiencing rather than on analyzing.

Analyses, or intellectualized integration of the techniques is not discouraged. Far from it, the patient is asked to assume a self-monitoring stance wherein he/she can experience and meaningfully assimilate the experience at the same time. At the very least, the patient can "hear" the difference between tension and relaxation because he/she has an instrument capable of transforming electrical impulses into meaningful sound. The same 'experiencing' mode of approach should be possible with cognitive reorganization procedures. With that in mind, let us now turn to the means by which we incorporated cognitive therapy into biofeedback therapy in the present study.

C H A P T E R IV

THE PRESENT STUDY

INTRODUCTION

The major purpose of the present study was to investigate the therapeutic benefits of Emotion Scanning -- a technique devised by the present author as an adjunct to biofeedback therapy, which combines features of both biofeedback/relaxation therapy and cognitive therapy. The first part of the technique involves patient charting of emotional reactions and has borrowed extensively from Beck (1976) and Epstein (1970). The second part of the technique involves using these emotional accounts in a highly structured office technique which allows the patient to recall his/her maladaptive responses and to practice substituting more appropriate forms of response as a means of alleviating emotional distress.

In the present study, the technique was investigated as part of a therapeutic regimen in the treatment of psychosomatic pain disorders. The onset and continuation of these pain disorders are closely associated with high levels of emotional distress. Therefore, it was considered that a comprehensive treatment protocol should

go beyond merely teaching individuals to master the physiological concomitants of stress, as is done in biofeedback therapy. It should ideally teach them how to lessen stress by not only maintaining greater physical calm, but by changing those interpretive processes which tend to be maladaptive in nature.

As previously mentioned, Emotion Scanning was designed for use as an adjunct to biofeedback therapy. As such, the office technique takes advantage of the biofeedback instrumentation as well as the patient's learned skills in relaxation. It also takes advantage of skills derived from cognitive therapy which help patients to analyze their emotions and formulate more adaptive responses. Before we examine Emotion Scanning in more precise detail, let us now review biofeedback and cognitive therapy and the rationale underlying their use.

4.1 BIOFEEDBACK AND COGNITIVE THERAPY: A REVIEW

Biofeedback therapy is a technique which in its usual format employs monitoring and mechanical feedback of various physiological systems, as well as educating the patient in the use of various physical and mental

strategies used in the production of relaxation. Both the mechanical feedback and the teaching of physical and mental strategies are geared toward bringing about a change in bodily function "for the purpose of relieving suffering (and) averting pathophysiological dysfunction (Rickles, et al., 1982). The physical and mental strategies include the use of regulated deep breathing, progressive relaxation, autogenic phrases, and guided imagery, all of which are designed to induce states of relaxation.

Cognitive therapy is a technique which utilizes therapist and patient discussions, as well as behavioral techniques. Both the therapist/patient discussions as well as the use of behavioral techniques are geared toward bringing about a change in interpretive processes for the purpose of relieving suffering and averting pathopsychological dysfunction. In a discussion of depression Beck states: "The therapeutic application consists of devising techniques to pinpoint for the patient his specific cognitive distortions and to demonstrate their invalidity. By achieving such a cognitive reorganization through behavioral or interview techniques, the patient may experience rapid diminution in all the symptoms of his depression" (1976, p. 271).

4.1.1 Basic Differences

Both techniques are geared toward relieving the patient's suffering and both are aimed at averting automatic responses in daily life which are maladaptive in nature. Beyond these similarities, there are some basic differences in the two therapies. These can be specified as follows:

1) Biofeedback therapy specifically addresses physiological responses, whereas cognitive therapy specifically addresses interpretive responses. Thus, while both are aimed at relieving suffering, the forms of human response which are focused on differ.

2) In general, most of the office time in biofeedback therapy is spent providing the patient with an experiential awareness of alternative responses, whereas most of the office time in cognitive therapy is spent providing the patient with a more intellectual (or cognitive) awareness of alternative responses. Thus, while both are geared toward providing the patient with greater awareness of alternative forms of response, their domain differs. Succinctly put, cognitive endeavors address the psyche while biofeedback endeavors address the soma. The aim of the present study was not to treat the

soma less, but to treat the psyche more.

Given the above domains of attention it makes sense that cognitive therapy has been used predominantly in the treatment of psychological disorders such as depression, while biofeedback therapy has been used extensively in the treatment of stress disorders.

In the case of psychosomatic pain syndromes, one is faced with concomitant psychological and physiological disturbances. It is not at all clear in which direction causality is flowing -- that is, whether the psychological disturbance leads to the physiological disturbance, or vice versa. The important point to keep in mind is that both aspects of the pain problem need to be dealt with in therapy.

EMOTION SCANNING

The formulation of "Emotion Scanning" attempts to close the gap between biofeedback and cognitive therapy; to incorporate some of the best from each in order to add to the clinician's therapeutic armamentarium in the treatment of pain.

4.2 Emotion Scanning: At Home Review

As the name "Emotion Scanning" implies, this technique invloves having patients scan, or look over their emotional responses, which they then record on the Emotion Scanning Record (see Appendix A). The utilization of scanning procedures is often found in biofeedback therapy (labeled and identified as body scanning), wherein patients are instructed to mentally monitor their physiological reactions in response to various events. Performing a body scan in biofeedback therapy requires educating the patient in what to look for; the same holds true for Emotion Scanning. Thus, the patient is educated in breaking down and identifying his/her emotional reactions into smaller, more manageable component parts. The procedure for performing an emotion scan is as follows:

At the end of the day, the patient practices a relaxation strategy which has been taught in the office. At the end of the relaxation induction process, the patient reviews his or her day -- focusing on the way he or she feels at that 'moment and then mentally 'moving backwards' over the course of the day's events. It may be explained as analogous to, or as if the patient were

watching a movie of his or her day which was being run in reverse. The patient is encouraged to simply monitor the various emotions experienced in response to events (as if he or she were an objective third party), without passing judgement on whether the response was "good" or "bad", and without necessarily re-experiencing the emotions felt.

In the course of scanning the day's emotional responses, the patient chooses one positive and one negative emotion to examine in greater detail. He or she then breaks down the respective responses into the following factors:

(1) The primary emotional response is determined and mentally rated on an ascending scale of intensity from 1 to 5.

(2) Any secondary emotional responses are determined and likewise rated on an ascending scale of intensity from 1 to 5.

(3) The most immediate and specific event precipitating the emotional response is noted.

(4) The automatic thoughts and/or images resulting from the event and culminating in the primary emotion are reviewed.

(5) The concomitant physiological changes experienced as part of the emotional response are identified and

examined as at least temporally, if not causally related.

At the end of the above review, the patient records his or her findings on the Emotion Scanning Record. At this point, the patient becomes a bit more analytical, or evaluative in the appraisal of the recorded emotions. In the case of negative emotions, the patient is instructed to formulate more adaptive or constructive thoughts which would serve to either lessen the intensity of the negative emotion or, if appropriate, eliminate it altogether. Similarly, patients are instructed to determine (construe) healthier forms of physical response which would alleviate, or perhaps even obviate the negative reaction.

In the case of positive emotions, patients are instructed to find physical responses which they used or could use in the future to heighten the positive feeling.

In regard to the automatic thoughts which produced the positive emotion, patients are invited to "have a little fun". They are instructed to discover a way in which to spoil a perfectly good emotion by changing their nice, healthy, constructive thoughts into unhealthy, destructive thoughts.

Notice the emphasis on "having some fun" in regard to

this final patient exercise. The purpose is not to have a patient 'spoil' or even (detrimentally) question the validity of his or her positive emotions, but to internalize the belief that he or she can, in fact, manage emotionality by changing the kinds of automatic thoughts and images engaged in. By having the patient examine ways in which a positive emotion might be destroyed (and then re-initiated), you are allowing that individual to examine from a 'safe distance' the control that he or she can possess in determining emotional reactivity.

4.3 EMOTION SCANNING: IN-OFFICE TECHNIQUE

When the patient comes in for therapy, the first order of business is to discuss with the patient his or her successes with the home practice sessions and to go over any difficulties encountered. Problems associated with the homework assignments can be addressed at this time, and additional input in regard to the emotional reactions can be gained.

The patient is then led through the biofeedback part of his/her therapy, wherein he or she hones the skills of inducing a relaxation response and is taught additional

relaxation techniques as appropriate. Following therapist-guided relaxation the patient is left alone with the instrumentation in order to practice the relaxation response without the aid of the therapist's verbal instructions.

During the time that the patient is left alone to practice, the therapist can go over the Emotion Scanning Record privately and select a response for use in the emotion recall and cognitive reformulation part of the technique.

In recalling stressful emotions, patients are encouraged to adopt the same attitude they utilized in reviewing the day's events at home. That is, they are instructed to assume a detached attitude -- in an important sense, they are observing themselves experience emotions as if they were disinterested third parties.

The emotion recall and cognitive reformulation is divided into three phases:

Phase One. Using the written report as a guide, one of the eliciting events presented in the homework assignment is briefly recalled for the patient. To aid in the patient's recall, he or she is instructed to visualize

the setting in which the event took place and to recall what he or she was doing just prior to the event. The delivery of the patient's automatic negative thoughts and feeling states are presented in the first person, and the patient is instructed to mentally rehearse these negative self-statements. (This technique of using the first person is analogous to the use of Autogenic Phrases in relaxation training.) In addition, the patient is reminded of the negative bodily changes reported in the Emotion Scanning Record, and is instrcted to re-produce the changes as he/she mentally rehearses the negative self-statements. Appropriate time and encouragement are provided to allow patients to effectively recall the emotion in question, and they are instructed to make a mental note of their feelings of discomfort.

Phase Two. After the patient recalls the event and his or her maladaptive response to it, the patient is instructed to 'let go' of the attendant thoughts and images. Their attention is then focused on establishing a relaxed state. Patients are verbally guided by the therapist, with special attention given to any residual manifestations of tension produced in the emotion recall.

Patients are instructed to note any changes in their experience as a consequence of their induced relaxation.

Phase Three. Upon completion of the relaxation phase, patients are again presented with the eliciting event recalled earlier. However, this time the patient's corrective self-statements are delivered in conjunction with attendant, more appropriate bodily corrections. The primary input to the patient comes from his/her own provision of corrective responses, as recorded in the Emotion Scanning Record. While additional suggestions by the therapist might be made, it is important to reinforce the patient's own capacity for formulating alternative corrective responses. Thus, even if a patient presents less than ideal corrections, those corrections will be used because they represent something that has originated with the patient and therefore something that the patient can relate to. Additional input can then be provided by the therapist without denigrating or minimizing the therapeutic benefit of the patient's own formulations.

At the end of the above recall and reformulation, the patient is instructed to briefly attend once more to general relaxation, and a discussion can then be held in

regard to the patient's experiences during the session.

4.4 CONSIDERATIONS

Two considerations arise in the utlization of this technique. First, because it is a technique which has been devised as an adjunct to biofeedback therapy, it is necessary to consider the optimal point at which to introduce the technique over the course of therapy. The second consideration concerns how to determine which event to present to the patient, given that there are a number of events to choose from. Let us address each of these considerations in turn:

4.4.1 Timing

In regard to the appropriate timing for introducing the technique over the course of therapy, it is my belief that patients should acquire some familiarity with the biofeedback protocol before the introduction of emotion scanning. First and most obviously, if a patient has come into therapy anticipating that he or she will learn about biofeedback and relaxation, then that patient should be

provided with the skills of that trade.

Beyond this obvious point, it needs to be kept in mind that the technique of Emotion Scanning relies heavily on the assumption that patients have already gained some measure of control over their physical responses, as well as over the induction of a relaxation experience. Hence, introduction of emotion scanning prior to the patient's having achieved some success in producing relaxed states is premature and should probably be avoided.

Once the patient has gained some proficiency in producing relaxation responses, emotion scanning is introduced as a means of enhancing the patient's learned control. Within a given session, the emotion recall and cognitive reformulation is provided after the patient has received a therapist guided relaxation strategy and has been provided with private practice with the biofeedback instrumentation.

The focus on general relaxation prior to emotion recall and cognitive reformulation serves a couple of functions. It provides the patient with strategies aimed at honing his/her relaxation skills. It also serves to put the patient in a more emotionaly neutral frame of mind, wherein focus is diverted away from distracting concerns and thoughts. It is assumed that in preceding

emotion recall with general relaxation, the patient is both more receptive and in possession of a greater sense of relaxed control.

The perception of relaxed control is important in the use of Emotion Scanning techniques. The objective in recalling stressful events is not to provide the patient with a catharsis of ego dystonic reactions. In fact, if a patient were to display an abundance of emotionality during the recall phase of the procedure it would be incumbant upon the therapist to take the necessary steps in gently guiding the patient out of his or her emotional distress.

In the use of Emotion Scanning, as I conceptualize the technique, a display of hyperemotionality would suggest that the technique had been introduced too early in the therapeutic regimen, and the therapist should take the necessary steps to remedy the situation. Thus, our objective is not a catharsis, or purging of irreconcilable conflicts. Rather, our goal is to present the patient with contrasting modes of response to an event, all experienced within the context of a non-threatening environment. In a sense, the patient is asked to 'experience' him or herself experiencing, as if the patient were an objective observer -- within the context

of the patient's felt control over situations, and within the safety afforded by the clinical setting.

4.4.2 The Selection of Events

The second consideration mentioned above concerns the means by which we, as therapists, select an event and emotional reaction to focus our attention on.

In my initial use of this technique, I made a mistake in my choice of criteria for selecting events -- a mistake which is not uncommon among clinical neophytes who, in their enthusiasm for effecting a "cure" for the patient, fail to give due consideration to the psychotherapeutic reality that individuals have their own pace by which they can effectively deal with difficult issues.

As my initial criteria for selecting events, I chose (1) the events for which emotional reactions were reported as being fairly intense, (2) events that highlighted emotional issues which served as the most frequent source of disturbance, and (3) events for which the patient exhibited the poorest skills in formulating alternative constructive responses. The employment of such criteria quickly educated me in the use of a more therapeutically

sensitive set of criteria.

I soon realized that in choosing an event in which the patient had experienced the greatest amount of failure in regard to effective coping, I was selecting as our object of focus the event with the least potential for being cognitively re-structured at that time in therapy. This does not mean, of course, that issues in which the patient has a lot of emotional investment should never be chosen. It simply means that therapists need to be sensitive to the patient's 'readiness' for dealing with specific traumatic issues.

In general, the foremost criterion for selecting an event to address in emotion recall calls upon the therapist to use his or her sensitivity and clinical judgement in choosing events that can challenge without threatening the patient in question. As a rule of thumb, the following criteria for selection can be successfuly employed with patients:

(1) Emotional responses should be of an interpersonal nature. Given the choice between annoyance with a car for not starting, and annoyance with a waitress for being incompetent, I would choose the event that involved another human being. Patients, and indeed people in general, often forget that while they are feeling very

affected by a situation, they are also affecting the feelings of those around them. (Besides, cars can be patched up. The same doesn't always hold true for relationships, however.)

(2) Emotional responses should be of moderate intensity. One wants to avoid situations in which the patient has so little emotional investment that the emotion recall is meaningless. At the same time, one wants to avoid those situations in which there is so much emotional investment that the patient will find emotional recall of it too threatening to deal with or devastating in consequence (a la primal scream therapy).

(3) Finally, events for which the patient exhibits a fairly decent capacity for formulating alternative constructive responses should generally be chosen over events for which the patient finds it difficult or impossible to determine alternative forms of response. It is important for the patient to experience some mastery in controlling his or her emotional reactions while in the office. Without the experience of successfully handling situations within the safety of the therapeutic encounter, a patient is unlikely to employ the techniques in his or her daily life; i.e., (platitudinous perhaps) "success breeds success".

C H A P T E R V

METHOD

Experimental Design

Patients who presented to a biofeedback clinic with psychosomatic pain syndromes were engaged in a study to examine the effectiveness of biofeedback therapy (the bf group) compared with the effectiveness of biofeedback combined with Emotion Scanning therapy (the bf/emo scan group) in the control of their pain. The groups were composed of five subjects each.

Pre-treatment levels of emotionality and self-esteem were assessed using the Primary Emotions and Traits Scale (PETS) (Epstein, 1983), and the Sources of Self-Esteem (SOSE) scale (O'Brien and Epstien, 1980). Patients then received three sessions during which they were introduced to the biofeedback instrumentation, trained in deep breathing techniques, and trained in the appropriate format for filling out the Pain Chart and the Reaction Chart. Upon completion of the training period, these two measures, which are described below, were maintained on a daily basis over the course of 7 weeks.

A standard course of biofeedback and relaxation training was delivered to all patients. This consisted of training in progressive relaxation, the utilization of autogenic phrases, and induced positive mental imagery, in that order. Upon completion of the third week of charting, the bf/emo scan group had their Reaction Chart replaced with the Emotion Scanning Record. They were introduced to emotional recall and cognitive reformulation the following week.

In order to adjust for the additional attention delivered to the bf/emo scan group during the latter half of therapy, the biofeedback group was provided with additional contact time with the therapist. This time consisted of allowing patients to ventilate about the stresses they were experiencing in daily life, or to discuss other topics of interest to them. The therapist served primarily as a listener during the contact time. (It should be noted that contact time is, in itself, therapeutic. However, it was felt that such time was necessary to compensate for and 'balance out' the additional attention provided the bf/emo scan group.

At the end of the course of therapy, all subjects again filled out the PETS and the SOSE to evaluate general changes in reported emotions and traits, and reported

levels of self-esteem.

5.1 MEASURES

Pre/Post Evaluations.

The Primary Emotions and Traits Scale, as well as the Sources of Self-Esteem scale were utilized as pre-post measures.

5.1.1 Primary Emotions and Traits Scale (PETS)

This scale was used to assess the general emotional state of the individual before and after treatment (see Appendix B). It consists of a number of subscales addressing the following -- positive-negative state, extroverted-introverted, neuroticism, ego strength, happy-depressed, calm-anxious, agreeable-angry, caring-uncaring, vigorous-fatigued, self esteem, and integrated-disorganized (Epstein, 1983).

5.1.2 Sources of Self-Esteem (SOSE) Inventory

The SOSE is a 116 item questionnaire which provides a general self-esteem score (see Appendix C). It addresses in addition, the following components of self-esteem: competence-incompetence, lovability-unlovability, self control, likability-unlikability, personal power-powerlessness, moral self approval-guilt, body appearance, body functioning, defensive self enhancement, and integration-inner conflict (O'Brien and Epstein, 1980).

5.2 PHYSIOLOGICAL RECORDING TECHNIQUES

Two physiological systems were monitored for all subjects, which consisted of musculoskeletal reactions and peripheral vascular responses.

For musculoskeletal responses, electromyographic (EMG) monitoring was derived utilizing the Autogenic 1700 Electromyograph. One trapezius placement of electrodes was employed during the initial training period in order to enhance patient awareness of abdominal (vs chest) breathing techniques. All other sessions utilized

electrode placements which were confined to the frontalis muscle. The standard bipolar frontal placement site was used, with two active elctrodes 2 cm above the midpoint of each eyebrow, and the ground electrode placed equidistant between the two actives. Feedback from the EMG consisted of an auditory clicking sound which increased or decreased in frequency in analog fashion as muscle tension increased or decreased.

Peripheral vascular changes were monitored using thermal biofeedback instrumentation. An Autogenic 1000 was used. The thermister was placed on the middle digit of the dominant hand in the standard fashion. Feedback from this modality was delivered verbally at the end of each session. Verbal feedback was deemed to be preferable to risking the possibility that subjects would become confused by using simultaneous feedback from both modalities.

5.3 REPEATED MEASURES

For the initial training period, patients began to keep daily charts of their pain and emotional experiences. These two charts were called the Pain Chart and the

Reaction Chart, respectively. Following the third week of recorded pain and emotional reactivity, the bf/emo scan group substituted the Emotion Scanning Record for the Reaction Chart. The bf group continued to fill out the same charts as previously. These three daily charting methods are described below.

5.3.1 The Pain Chart

The pain chart was filled out by the individual for the most intense pain episode of a given day. The chart addresses medication intake, pain intensity, pain duration, incapacitation, and frequency of pain episodes. Further it addresses the degree to which the individual succeeds in controlling the experience of pain. Finally, it addresses mood changes as a function of the pain episode. Using bipolar emotion charts which are based on scales developed by Epstein, individuals provided intensity ratings for moods experienced before and during pain episodes.

The chart was designed to record pain episodes over the course of seven days. If patients experienced more than one pain episode on a given day, they made note of it

on the chart (see Appendix D).

5.3.2 The Reaction Chart

This chart was devised to address the most positive and the most negative reactions in an individual's day. Each chart covers a period of 7 days. The front side of the chart provides intensity ratings for the most positive and negative emotion experienced per day. Patients were permitted to rate more than one emotion in response to any given situation. However, they were instructed to distinguish primary emotions from secondary emotions by appropriate use of the rating scale. A space was provided for a description of the event which precipitated the emotional reaction.

The back side of the chart provides intensity ratings for the bodily changes, which transpired in conjunction with the primary emotion. The individual rated the specific physiological system for how mild to great the changes were, and then described in more exact detail the changes that took place (see Appendix E).

5.3.3 The Emotion Scanning Record

The Emotion Scanning Record has been described previously (see Pp. 82-85 of this report). It provides the same data as that provided by the Reaction Chart. The difference lies in the kind of evaluation that subjects were required to make.

Rather than simply rating the intensity of the most positive and negative emotions and noting the event that appeared to cause the emotion, patients were required to note their automatic thoughts and/or images at the peak of the emotion and to formulate alternative responses. Similarly, rather than simply noting the bodily changes that transpired as a consequence of the emotion, this chart also required subjects to formulate alternative bodily responses that they might use which could enhance positive emotions, or lessen the intensity of negative emotions (see Appendix A).

5.4 SUBJECTS

Subjects were chosen from a pool of patients who presented with pain syndromes to a biofeedback clinic. The initial screening of subjects was performed by a practicing physician who is board certified in both Psychiatry and Internal Medicine. In this initial screening procedure, medical records were obtained from available sources, a mental status evaluation was performed, and additional tests were ordered when necessary.

Patients were assessed for the presence of a psychosomatic pain syndrome. A psychosomatic pain syndrome is defined as the presence of pain in the absence of sufficient organic pathology that would account for the degree of discomfort experienced. Inclusion in the study required that the following characteristics be ruled out:

1) No progressive, organic disease was present requiring more immediate forms of medical intervention.

2) No other concurrent medical conditions were present which would have required precautionary treatment; e.g., diabetes, epilepsy, hyperthyroidism, etc.

3) No other concurrent psychological conditions were present which might have become more intense in the

absence of other therapeutic treatment; e.g., schizophrenia, borderline psychosis, severe hysteria, and clinical depression.

After initial screening, potential subjects were presented to the present therapist for inclusion in the study. Subjects were assigned to either the bf group or the bf/emo scan group according to the following matching variables:

1) Type of pain syndrome.

Both groups of subjects were similar in terms of the presenting problem. Specifically, the groups did not differ in terms of the number of subjects whose complaints were the product of maladaptive striated muscle activity (e.g., as in muscle contraction headaches and lower back pain), versus subjects whose complaints were chiefly the product of maladaptive smooth muscle activity (e.g., as in migraine headaches or Raynaud's syndrome).

The patients included in this study presented with a ratio of 4 subjects with striated muscle dysfunction to 1 subject with smooth muscle dysfunction for each group.

2) Age.

Older subjects have a more difficult time learning control over physiological activity than younger subjects, most

likely due to a) more rigid beliefs concerning the possibility of control, and b) other complicating aging factors such as arthritis, cardiovascular dysfunction, Alzheimer's Disease, etc. Therefore, the groups did not differ significantly in mean age.

The subjects in the biofeedback group ranged in age from 21 to 65 (mean = 45.2). The subjects in the bf/emo scan group ranged in age from 22 to 54 (mean = 39.8).

3) Sex.

The incidence of pain syndromes may be complicated by sex-related factors such as, for instance, the taking of birth control pills among women. Potential sex of subject biases were controlled for by matching on this variable. Also, possible sex of subject by sex of experimenter interactions were eliminated by matching on this variable.

The ratio obtained on the sex variable resulted in 4 females to 1 male for each group.

Overall, the utilization of matching variables resulted in a selection of subjects with the following characteristics:

BF GROUP

Pain Type	Age	Sex
Striated/head	38	M
Striated/back	60	F
Striated/back	42	F
Striated/cervical	65	F
Smooth/head	21	F

BF/EMO SCAN GROUP

Pain Type	Age	Sex
Striated/head	22	M
Striated/back	38	F
Striated/back	54	F
Striated/head	51	F
Smooth/head	34	F

5.5 PROCEDURE

Session A

After signing the consent form, subjects were introduced to the Reaction Chart and instructed in how to fill it out. They were then hooked up to the biofeedback instrumentation and instructed in the form of feedback they would receive throughout the course of treatment. Patients were then instructed in deep breathing techniques, which they were told to practice at home on a daily basis. At the end of their daily home practice, patients were told to mentally review their day and choose the most positive and negative emotional reaction, which they would then record on the Reaction Chart. As previously noted, they also recorded the bodily changes which transpired in conjunction with the primary emotion.

Session B & C (Training Periods)

Difficulties encountered in the home monitoring of daily emotions were discussed with the patients during this session. Problems with practice compliance were also addressed. Patients were then taken through a relaxation session of deep breathing, and provided with private

practice time with the instrumentation. Following the private practice, patients were introduced to the Pain Chart and instructed in the appropriate means for filling it out. (These first few weeks of daily recording served as practice for the patients and were not included in the final analysis.) At the end of the third session (session C), patients were provided with the daily charting forms, which were maintained for the remaining seven weeks of therapy.

Sessions 1 through 3

Each of these sessions were conducted in the following way: The first part of the session was used for discussion in order to address the patient's successes or difficulties with the home practice. Difficulties associated with the daily charting methods were also addressed. Patients were then taken through a therapist guided relaxation session, followed by private practice with the instrumentation. A discussion with the patient followed the private practice which addressed any difficulties they were experiencing. At the end of the session, patients were given the Pain and Reaction Charts to be filled out for the following week.

At the end of the third session, the bf/emo scan group was provided with the Emotion Scanning Record, which

took the place of the Reaction Chart that they had previously filled out. On the Emotion Scanning Record, patients continued to record their most positive and negative emootions as well as the bodily changes experienced. In addition, this chart required subjects to ascertain their automatic thoughts at the peak of the respective emotions and to formulate alternative thoughts that they might have used. They also recorded alternative bodily responses that they could engage in.

Sessions 4 through 7

Beginning with the fourth week, the bf/emo scan group began to receive training in emotion recall and cognitive reformulation, in the manner perviously described. The sessions were conducted in a fashion similar to that described above. The first part of the session involved a discussion period, followed by guided relaxation and private practice. At this point, the bf/emo scan group was guided in the emotion recall and cognitive reformulation techniques (see pages 85-88 for a review of the specific strategies employed.)

In order to adjust for the added attention being provided to the bf/emo scan group, the bf group was provided with a contact control, during which they were allowed to verbalize on any topic of their choosing.

Therapist intervention was kept at a minimum during this contact time.

C H A P T E R VI

RESULTS

Physiological Recordings

6.1 EMG Activity

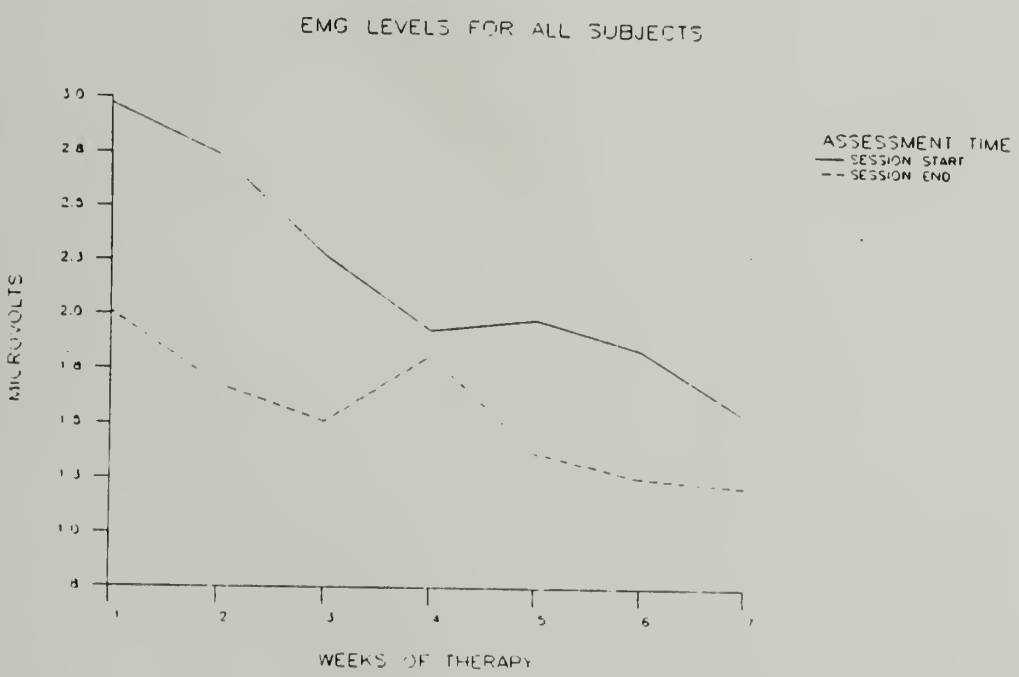
The frontalis muscle was employed as the electrode placement site for all subjects, using a band width of 100 Hz in order to maximize the scope of electromyograpgic monitoring. Recordings of EMG activity were assessed at the beginning and end of each session.

Beginning levels of muscular tension were monitored by having the patient rest quietly for a one minute period. During this time, microsecond assessments of muscular activity were recorded after they were computed and averaged by the Autogenics 1700. Final levels of muscular tension within the individual sessions were assessed following the therapist-guided relaxation session, and the procedure described above was again employed.

Figure 1 shows the average levels of emg activity

across both groups of subjects at the start and end of each week of treatment. As can be seen from this figure, subjects were generally able to demonstrate a relaxation response, as measured by frontalis electromyographic recordings.

Figure 1



The protuberance which is observed for the end levels of emg activity on week four is primarily a consequence of one subject in the biofeedback group who ended the relaxation training period on that week with an unusually high amount of muscular tension (end level = 6

microvolts). This single subject's excessive tension on week four and her resistance to therapeutic relaxation served to skew the data for that particular week. In terms of the study, her atypical response to relaxation therapy is not relevant in and of itself. What is important is the fact that the observed upward swing of emg activity on week four is not a product of any systematic increased tension for the bf/emo scan group -- a finding which, had it been present, might have suggested that the introduction of Emotion Scanning was in some way 'threatening' to the group. As far as our physiological recordings are concerned, this was not the case.

Beyond a demonstrated capacity for muscular relaxation when patients are focused on the task within the comfort afforded by the therapeutic setting, it was also of interest to assess the degree to which patients were utilizing their relaxation techniques while outside of the therapy session.

Obviously, patients cannot be followed, and/or permanently attached to emg instrumentation. Thus, the only way that we can objectively assess the degree of practice of relaxation techniques outside of the office environment, is to evaluate the starting levels of muscular tension demonstrated by the patient upon arrival

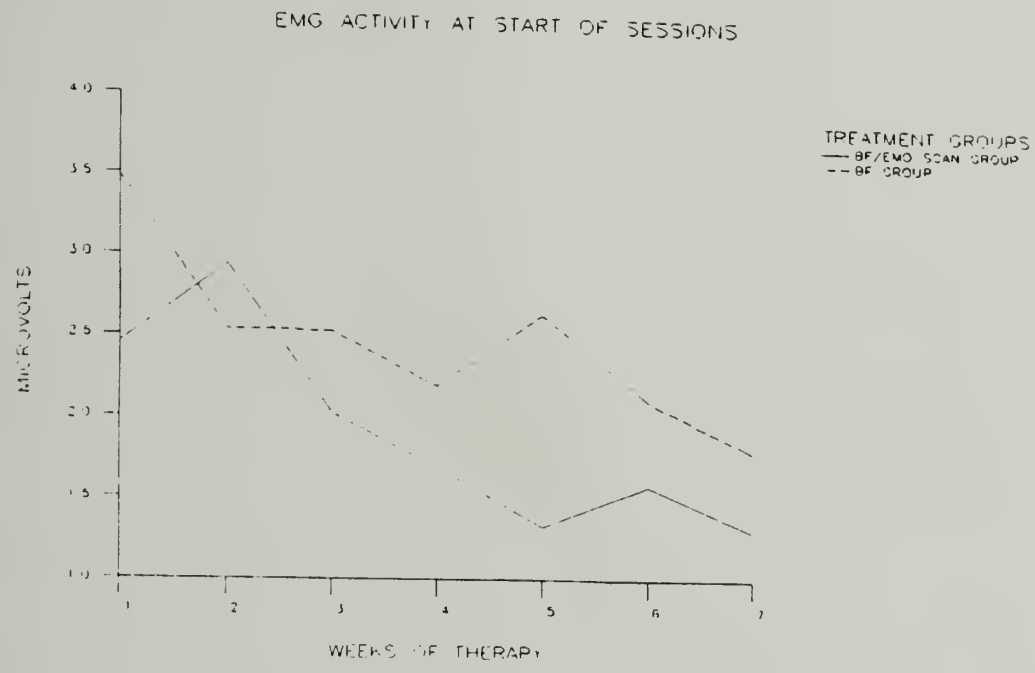
for the following week of therapy; i.e., compared to the previous week's performance. One would expect to find a generalized, progressive decrease in emg starting levels over the course of therapy, if the therapy were proving beneficial. In this way, we can ascertain the overall degree of carryover of learned relaxation from one session to the next.

An analysis of variance using repeated measures was performed on the observed starting levels of emg activity recordings, which used treatment as the between group factor, and weeks of recorded therapy as the within group factor.

There were no group by weeks of therapy interactions, which indicates that the addition of Emotion Scanning therapy to biofeedback therapy did not detract from the bf/emo scan group's capacity to attend to relaxation training.

A main effect for weeks of therapy was found, wherein both groups of subjects demonstrated significantly less muscular tension at the start of sessions as they progressed over the course of treatment, $F(1,6) = 3.08$, $p < .01$. Figure 2 demonstrates the mean levels of emg activity at the start of sessions for both groups of subjects.

Figure 2



In examining this figure, it appears that the bf group began treatment with higher levels of average tension than did the bf/emo scan group, whereas the bf/emo scan group started lower, but then immediately increased in tension on the second week of therapy. A specific examination of individual responses of patients across the successive weeks of therapy, however, revealed that this was not the case. The higher starting level of emg activity on week one for the bf group is a consequence of one biofeedback subject who demonstrated a particularly

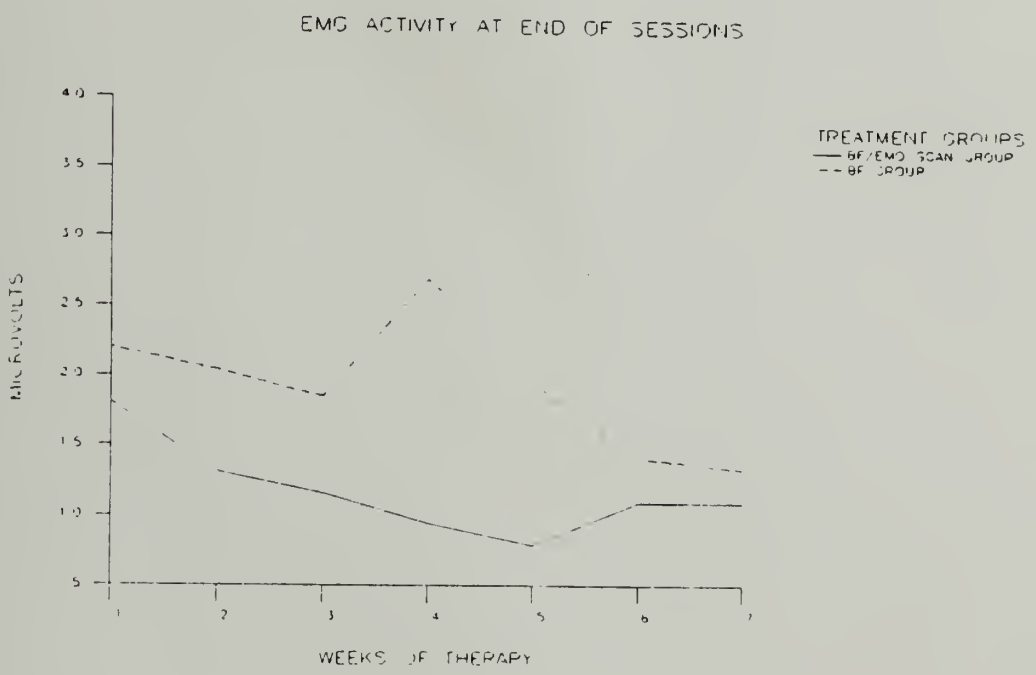
high level for that single week (emg start level = 7 microvolts). The protuberance on week two for the bf/emo scan group is also the result of one subject who manifested excessive tension (emg start level = 6.75 microvolts).

The downward trend of lower starting levels of emg activity for both groups of subjects was strong enough to override the single subject variations which took place on any given week, thus providing us with a significant main effect for weeks on this dimension. What is interesting to note is that both of the subjects who demonstrated especially high levels of emg activity on weeks one and two, respectively, entered therapy as individuals who experienced muscular contraction headaches. Their headaches were secondary features of their primary pain problems relating to the spine. This finding holds true, as well, for the single subject referred to earlier in the evaluation of Figure 1, wherein an unusual increase in the end levels of emg activity on week four was found when averaging the weekly responses across both groups.

An analysis of variance using repeated measures was also performed on the end levels of emg activity, again using treatment as the between group factor and weeks of therapy as the within group factor. Figure 3 demonstrates

the levels of mean emg activity at the end of sessions for both groups of subjects across the course of therapy. The protuberance demonstrated on week four by the bf group, which was attributed to one subject's idiosyncratic response, can again be observed in this figure.

Figure 3



The ANOVA using repeated measures revealed no statistically significant effects of any kind on this particular dimension. The lack of significant findings on the dimension of end levels of emg activity across weeks of therapy can be attributed to two factors:

First, the subjects varied considerably in their respective abilities to release muscular tension. A few subjects were able to dramatically release muscular tension within the very early stages of treatment, most subjects were able to reduce muscular tension only after a number of training sessions, and some subjects were only able to achieve overall reductions in muscular tension 'relative' to their starting positions (and, on occasion, these individuals actually ended a relaxation session with higher levels of muscular tension than they began with). Hence, subject variability presented a problem in the statistical analysis of end levels of emg activity evaluated over time.

Second, a 'ceiling effect' (or perhaps we should say a 'basement effect') presents itself in evaluating the lower limits of electromyographic activity. That is, given the use of a band width of 100 Hz in monitoring muscular activity, it is unlikely that many individuals are going to reduce the monitored microvolt levels much below .05 to 1.00 microvolts -- especially within the limited length of training which these subjects received.

When you combine the effects of subject variability with the effects of 'ceiling' (or 'basement') effects, it is not surprising to find a non-significant main effect

for weeks regarding end levels of emg activity, [$F(1,6) = 1.88$, $p > .05$].

6.2 Peripheral temperature activity

The middle finger of the dominant hand was used for themister placement on all subjects. Peripheral temperatures are, of course, closely associated with sympathetic nervous system activity. That is, the end arteries that supply the pulp of the finger are innervated by sympathetic fibers alone. There is no parasympathetic innervation present. Thus, in measuring peripheral temperature, we have a single variable index that is reflective of autonomic sympathetic nervous system activity.

The difficulty in evaluating peripheral temperature in terms of using any given measurement of temperature as an index of relaxation is that peripheral temperatures are not only affected by emotionally stressful responses, but they are affected by environmental conditions (i.e., cold temperatures), as well as by the consumption of various substances, such as coffee, cigarettes, the taking of sympathomimetic drugs, etc.

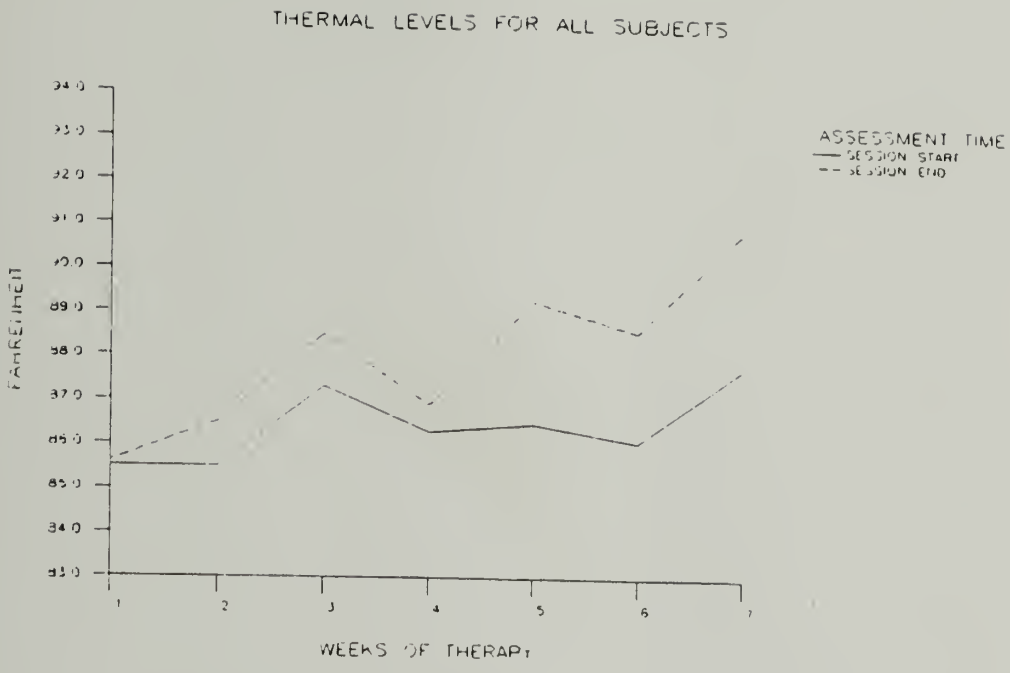
For this reason, starting levels of peripheral temperature were of less import than the ending levels of peripheral temperature. (In this regard, we must qualify that statement and remind the reader that had we been treating patients with, for instance, Reynaud's or Berger's disease, the concern with starting levels of peripheral temperatures would have been greatly enhanced.)

In addition to the meaningfulness of absolute temperatures, we were also concerned with the degree of observed change within each session. Figure 4 shows the average temperature for all subjects at the start and end of each relaxation session. As was the case with emg activity, for each week of therapy all subjects were generally able to demonstrate a reduction in sympathetic nervous system activity as measured by peripheral thermal responses.

An analysis of variance using repeated measures was used to evaluate thermal responses over time. Treatment was used as the between group factor, and weeks of therapy served as the within group factor.

Here, again, no group by weeks of therapy interactions were found, suggesting that both groups of subjects learned comparable degrees of relaxation.

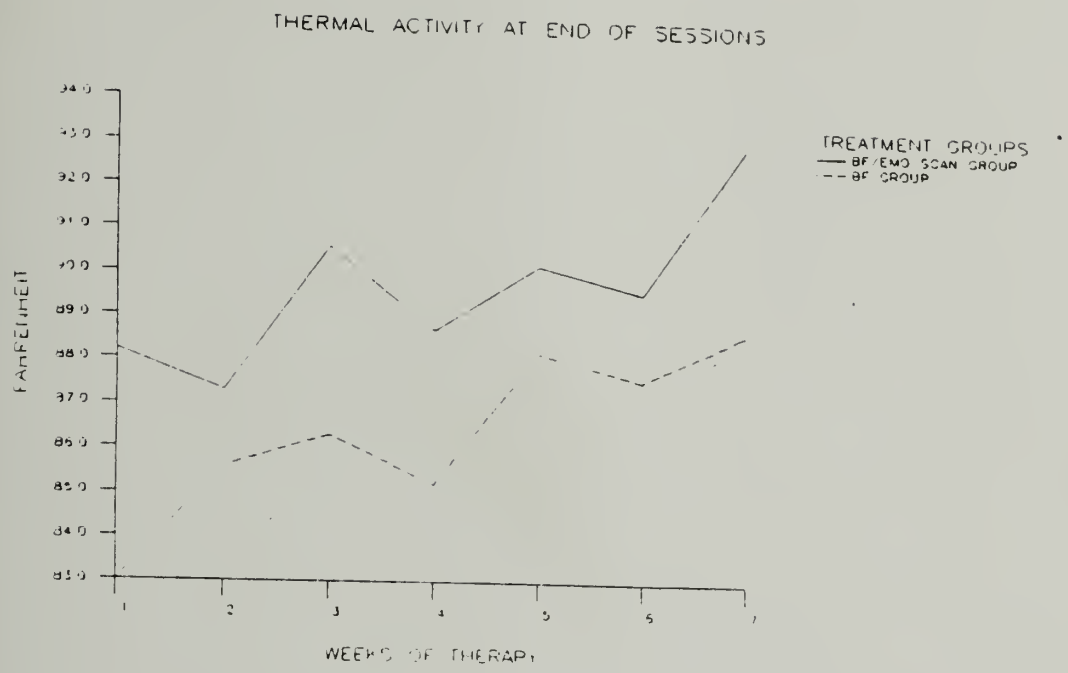
Figure 4



A main effect for weeks of therapy was found for the end levels of thermal response over the course of treatment sessions, $F(1,6) = 2.41$, $p < .05$. The group means of end temperature for each week of therapy can be seen in Figure 5.

As can be seen in this Figure, there is an overall upward swing in peripheral temperature for both groups at the end of the successive relaxation sessions. The observation that the groups were able to achieve higher degrees of peripheral temperature across the weeks of

Figure 5



therapy suggests that the 'depth' of the relaxation response improved for both groups over time.

Recall that in monitoring peripheral temperature, we are essentially evaluating arousal levels of the sympathetic portion of the autonomic nervous system. A by-product of relaxation therapy, then, is an allaying of such sympathetic nervous system activity, which is meaningfully measured by peripheral vascular changes.

An ANOVA using repeated measures was also performed on the starting levels of peripheral temperature (i.e., before the therapist guided relaxation session), again

using treatment as the between group factor and weeks of therapy as the within group factor. As with the preceding analyses, no main effect for treatment group [$F(1,6) = .84$, $p > .05$], or interactive effect [$F(1,6) = 1.03$), $p > .05$], was found to be of statistical significance. In addition, no main effect for weeks of therapy was found for the thermal responses demonstrated at the start of sessions [$F(1,6) = .81$, $p > .05$].

As already discussed, the beginning level of peripheral temperature, while serving as an index of sympathetic nervous system activity (and therefore reflective of stress-related states), is influenced by a number of factors which are non-specific to relaxation.

For this reason, I was generally less concerned with starting levels than I was with ending levels of thermal response. My lack of clinical concern in this area was supported by the fact that, in general, patients had starting levels of temperature which were within acceptable medical limits and which were not associated with pathological peripheral circulation.

In addition to the above, an experimental design consideration must be reviewed, which will add to our understanding of the lack of statistical significance in the analysis of starting thermal assessments across time.

As will be recalled, the form of feedback which patients received on their thermal responses was delivered verbally at the end of the session. This form of feedback stands in contrast to the continuous feedback which patients received from the EMG in regard to muscular responses.

Delivering the information gathered from the thermal instrumentation in a verbal manner was deemed to be necessary in order to avoid 'flooding', or overwhelming the patient with too much information at the same time. Common sense and past experience have both taught me that in providing continuous feedback from two sources of biofeedback instrumentation at the same time, the patients easily get confused in distinguishing which audio signal is related to which physiological system.

Using visual feedback from one piece of equipment and audio feedback from another piece of equipment would not eliminate the problem. What one finds is that the patient becomes more concerned with the external feedback than with his or her own internal state. This is, of course, the exact opposite of our goals in using biofeedback instruments. That is, mechanical feedback should serve as a tool that enhances the patient's awareness of internal cues, and should not be the sole focus of attention. In fact, providing simultaneous, continuous feedback from two

instruments can actually result in the patient becoming more anxious, rather than less, due to performance demands.

Thus, providing the patients with continuous mechanical feedback from the EMG, and verbal feedback from the thermal instrumentation was viewed as being of greatest benefit to the individuals in question -- or, in any case, the most reasonable compromise that could be devised.

Nevertheless, the absence of continuous thermal feedback probably impeded the subjects' capacities for enhancing their sensitivity and/or conscious control over this particular physiological system. When viewed in this manner, the significant effect that was found for end levels of thermal response over the course of treatment is likely to be reflective of progressively deeper levels of acheived relaxation. That is, the observed increases in temperature over time are interpreted to be a by-product of deeper and more profound states of relaxation as patients continued to practice and hone their skills on a weekly basis.

6.3 Pre-Post Measures

The Primary Emotions and Traits Scale (PETS) and the Sources Of Self Esteem scale (SOSE) were administered prior to the start of treatment, and again at the conclusion of treatment. A one-way analysis of variance for each dependent variable of the PETS (see Table 1), and the SOSE (see Table 2) pre-tests was performed that allowed for a test of the equality of group means. No significant differences between the groups were found prior to the start of treatment.

Table 1

One-way ANOVA of Pre-test Scores from the PETS

	GROUP MEANS				
FACTOR	BF	BF/EMO	DF	F	p
POSITIVITY	55.2	45.4	1	.71	.42
EXTROVERSION	36.4	36.2	1	.003	.95
LOW NEUROTIC	35.2	35.0	1	.001	.97
EGO STRENGTH	43.2	39.4	1	.28	.61
HAPPINESS	35.2	31.4	1	.30	.60
CALMNESS	12.4	12.2	1	.001	.97
AGREEABILITY	19.0	17.0	1	.34	.58
CARING	31.6	34.2	1	.63	.45
VIGOROUSNESS	19.6	21.8	1	.29	.61
SELF-ESTEEM	20.0	16.8	1	.59	.46
INTEGRATION	23.6	18.4	1	1.38	.27

Table 2

One-way ANOVA of Pre-test Scores from the SOSE

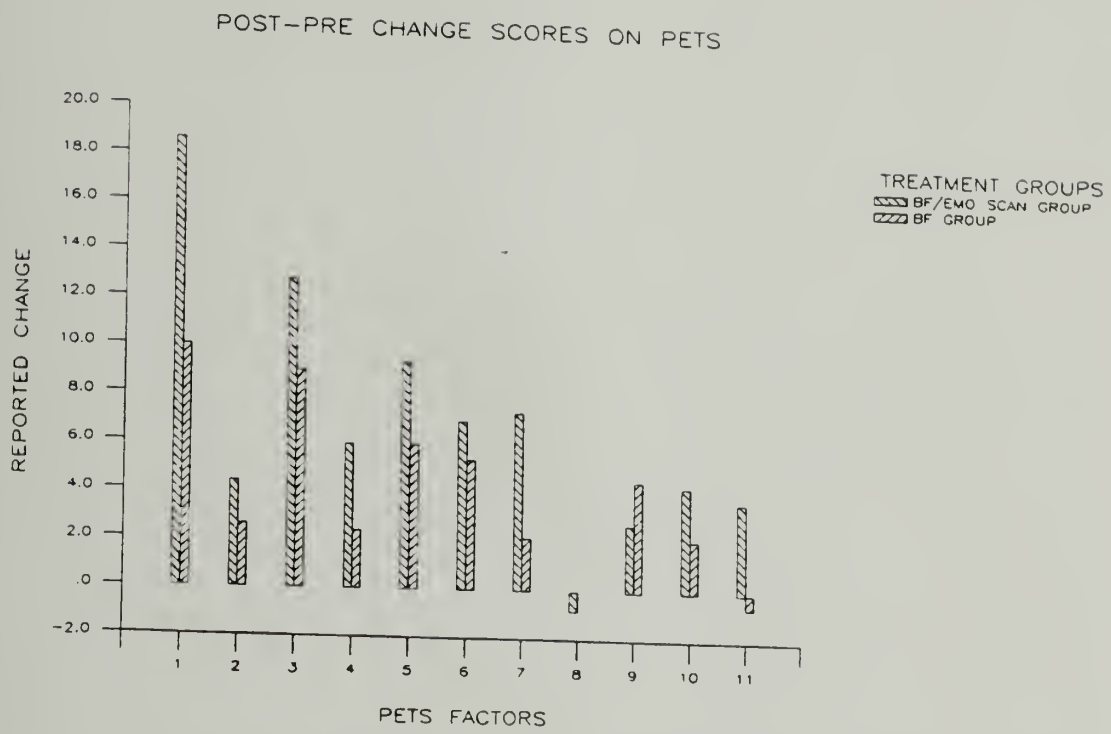
FACTOR	GROUP MEANS BF	BF/EMO	DF	F	p
SELF-ESTEEM	27.4	17.8	1	2.83	.13
COMPETENCE	33.6	31.6	1	.32	.58
LOVEABILITY	32.4	25.2	1	1.64	.23
LIKEABILITY	34.0	27.6	1	3.16	.11
SELF-CONTROL	34.4	33.4	1	.09	.76
POWER	32.2	27.4	1	.81	.39
SELF-APPROVAL	41.6	42.4	1	.04	.84
BODY APPEARANCE	33.8	24.8	1	3.89	.08
BODY FUNCTION	24.4	23.6	1	.01	.89
SELF-ENHANCING	54.2	51.4	1	.64	.44
INTEGRATION	29.4	21.8	1	1.58	.24

It was decided that an examination of the change scores between the pre- and post-tests would prove useful in order to determine if the subjects changed in a statistically significant fashion overall -- i.e., across groups.

The bf/emo scan group and bf group change scores for each of the dependent variables in the PETS and SOSE can be seen in Figures 6 and 7, respectively. As can be seen from the figures, the bf/emo scan group did report greater increases in a positive direction than did the bf group on

most variables.

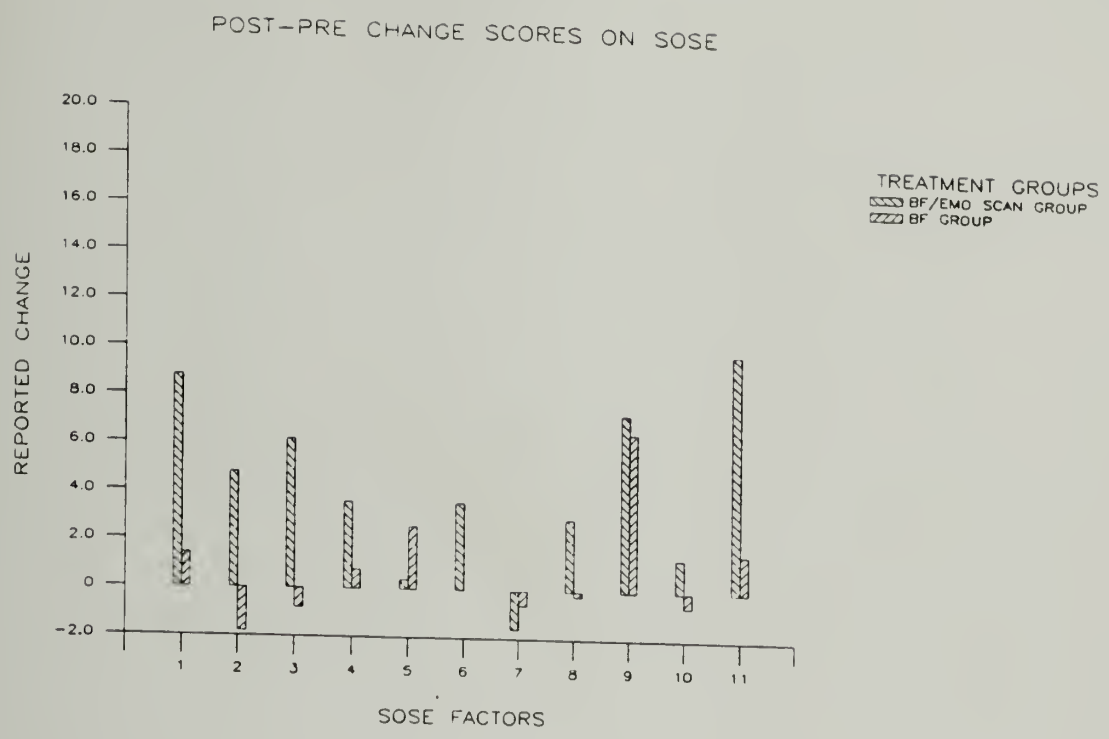
Figure 6



On the PETS, the bf/emo scan group reported greater increases on all dimensions, with the exceptions of "vigorousness", on which the bf group reported greater increases, and "caring", on which both groups actually reported a slight decline on the post-test measure.

On the SOSE, the bf/emo scan group again reported greater increases on all dimensions, with the excetions of "self-control", on which the bf group reported greater increases in their change scores, and "self-approval", on

Figure 7



which both groups again reported a slight decline on the post-test measure.

To analyze the overall changes betwen the pre-test and post-test measures across groups, two-sample t tests were computed for the dependent variables.

On the PETS, the change in reports of "general positivity" was found to be of statistical significance, $t(9) = 3.44$, $p < .01$. The general traits of "low neuroticism" and "ego strength" were also found to be significant, $t(9) = 4.13$, $p < .01$ and $t(9) = 2.81$, $p < .05$, respectively. In addition to the significance of

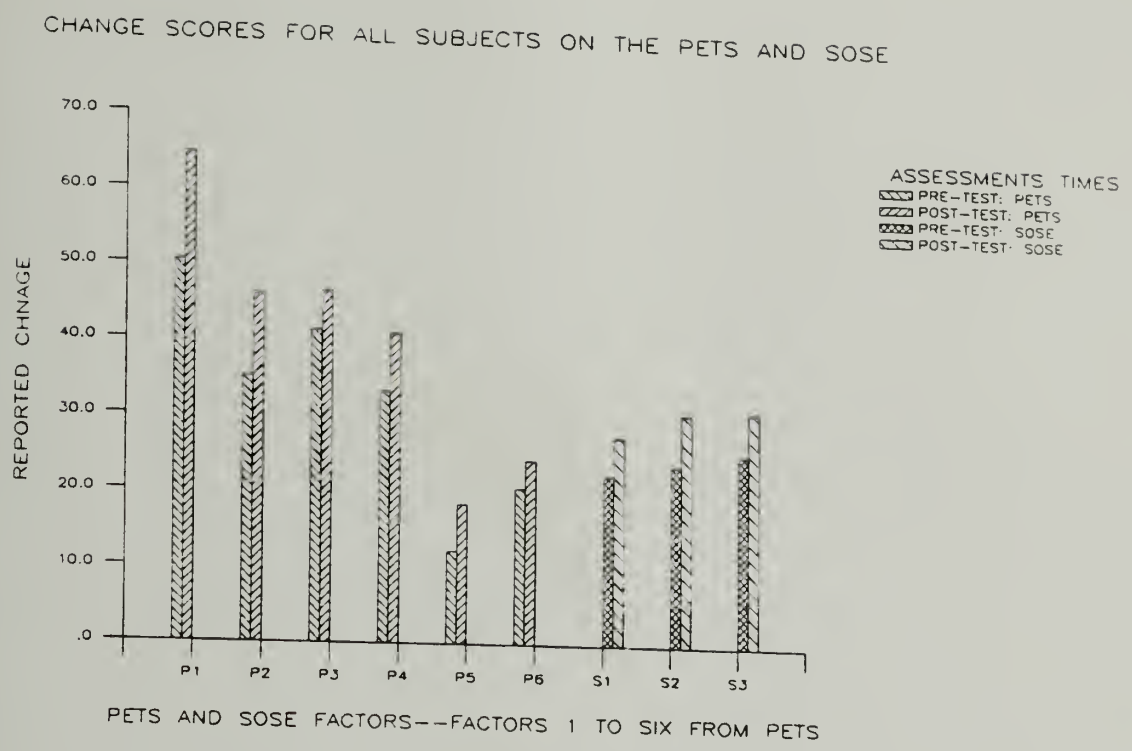
general traits, in the analysis of the PETS, statistically significant differences were also found for "happiness" [$t(9) = 2.91$, $p < .05$], "calmness" [$t(9) = 3.05$, $p < .01$], and "vigorousness" [$t(9) = 2.46$, $p < .05$].

The analysis of the SOSE resulted in significant overall changes across both groups in those variables that assessed "body functioning" [$t(9) = 3.82$, $p < .01$], "general self-esteem [$t(9) = 2.61$, $p < .05$], and feelings of "identity and integration" [$t(9) = 3.27$, $p < .01$].

Thus, from the above results, it appears that both biofeedback alone and biofeedback coupled with Emotion Scanning therapy are useful tools in enhancing individuals' perceptions of their emotional and self-esteem statuses. In Figure 8, the significant changes referred to above can be viewed.

It was apparent from looking at the change scores of the two groups individually that the bf/emo scan group was reporting greater changes in a positive direction than the bf group. Because change scores are affected by the beginning levels of each group, to examine the differences between groups on the post-measures an analysis of covariance was performed. In this analysis, the influence of the prescores was partialled out from the postscores.

Figure 8



In performing the analysis of covariance on the postscores, it was found that the groups did not differ in a significant fashion on any of the variables assessed by the PETS. The analysis of covariance on the postscores of the SOSE demonstrated group differences on the variables of competency, ($F=14.6$, $p = .006$), loveability (F 5.22, $p = .05$), and likeability ($F = 5.21$, $p = .05$). In addition, the variable of integration showed a significant difference between the groups ($F = 9.77$, $p = .01$). In all of the findings, the direction of change revealed the

bf/emo scan group to be showing the greatest improvement.

In summary, a number of significant changes which were assessed by the PETS and the SOSE were found to be of statistical import. In terms of positive increases across both groups, it was found that both biofeedback and biofeedback in conjunction with Emotion Scanning resulted in several significant changes. On the PETS, subjects reported significant increases in their reported levels of "general positivity", "low neuroticism", "ego strength", "happiness", "calmness", and "vigorousness". On the SOSE, subjects reported significant positive increases in their reported levels of "body functioning", "general self-esteem", and "indentity and integration".

Analyses of covariance on the post-test scores of the PETS and SOSE were also performed. In these analyses, no group differences on the PETS were found that reached statistical significance at the .05 level.

This is an interesting finding in light of the fact that the analyses of the SOSE did produce significant results. On the SOSE, that is, we did find that the bf/emo scan group did report significantly greater positive changes than the bf group on the dimensions of "competency", "loveableness", "likeableness", and "integration".

Given the observed significant changes on the pre- and post-measures of the SOSE, a question arises as to why the group changes on the pre- and post-measures of the PETS did not reach statistical significance. There are a couple of possibilities that I should like to make note of regarding this question, the first of which is fairly obvious and the second of which is more speculative in nature.

First, the observed group changes on the PETS, while of substantive interest, were not 'robust' in a statistical sense; i.e., the N was too small and the variability too great for our analysis to be statististically sensitive to the reported changes which can be perceived by the eye because of the aid provided by knowledge accumulated by weeks of therapy and familiarity with the patients.

Second, the two scales address two different dimension of human experience. The PETS is primarily concerned with the 'frequency' with which individuals experience various emotions (such as sadness, worthiness, happiness, etc.), as well as the 'frequency' with which individuals experience various traits (such as feelings of being charged up, capable, in control of events, etc.). The SOSE, on the other hand, addresses statements related,

as the name suggests, to sources of self-esteem, 47% of which are evaluated in terms of how often the individual experiences the various thoughts and feelings suggested by the items, and 53% of which are evaluated in terms of how true or false the statements are in regard to one's life.

The question of how frequently or often I experience a particular emotion or state of being is different from the question of how true or false a statement is in regard to describing the self. For example, it is a common observation among writers of dissertations, myself included, that they experience high levels of anxiety, frustration, depressed moods, etc. Nevertheless, if one were to ask any of these writers how true it was of themselves that they were prone to states of anxiety, easily frustrated or readily depressed, I strongly suspect that the majority would respond in a negative direction. Taking myself as an example, the fact that I have experienced many moments of anxiety in the recent past (due to the computer shutting down unexpectedly, for instance), does not mean that I believe myself to be prone to anxiety. Finding myself frequently frustrated because I'm three hundred miles away from the computer everytime I want to write does not mean that I perceive myself as easily frustrated. Nor does feeling disheartened, or

depressed because I may have re-written a paragraph a dozen times and still feel dissatisfied mean that I perceive myself as someone who is readily depressed.

In other words, the fact that I (like many other dissertation writers), have sustained multiple 'anxiety attacks', innumerable episodes of frustration, and many noteable moments of depressed mood does not mean that I perceive myself as an anxious, frustrated, depressed individual. If anything, I am a master of handling anxiety, frustration, and depression.

In comparing our statistical findings from the PETS and the SOSE, we found that the groups did not significantly differ from one another in terms of the degree of reported changes in their primary emotions and traits. However, the bf/emo scan group did report significant increases on the SOSE in regard to the dimensions of competency, loveableness, likeableness, and general feelings of integration.

In this regard, it is as if the bf/emo scan group was able to acknowledge at the end of treatment that they still felt sad, or anxious, or guilty, etc. (albeit, less sad, anxious, or guilty than at the start of treatment), but they no longer equated these negative emotions with feelings of incompetency, inadequacy, unloveableness, etc.

The bf group, on the other hand, was not apparently able to make a distinction between the experiences of negative feelings and the meaningfulness of these negative emotions in terms of their overall evaluations of the self.

6.4 Daily Reports of Emotions

On the Reaction Chart, used by all subjects during the first half of therapy, and on the Emotion Scanning Record, used by the bf/emo scan group during the latter half of therapy, subjects recorded on a daily basis their most positive and negative emotional reactions. In addition to the report of emotional responses to specific daily events, subjects also recorded any physical changes which they experienced concomitantly with their respective positive and negative emotions. Subjects recorded their emotional and physical responses by using an ascending scale of intensity from 1 to 5, with 1 signifying a mild response and 5 signifying an intense response. In performing the analyses of the daily reports of emotional experiences, the absence of a numerical rating for any given emotion or physical change was recorded as a 0, indicating that the variable in question was not relevant

to the individual's perception of his or her response.

It should be noted here that a distinction was made between missing data and non-rated variables as they related to a particular emotional response. In examining the charts used to record emotional responses, it will be recalled that subjects had the option of rating, for instance, "love", "worth", "happiness", and/or "security" in regard to any single recorded emotion. Thus, a subject may have assigned an intensity rating of 3 to "happiness" and 2 to "security". In transcribing this subject's responses, the individual in question would receive a 0 for both "love" and "worth", and would receive the reported levels of 3 and 2 for "happiness" and "security", respectively.

On occasion, subjects would enter therapy with no ratings or comments on the emotion charts for one or more days of the previous week. When this happened, the day or days containing missing data were examined with the patient and, whenever possible, the missing data was filled in before the patient left for the day. If the patient was unable to recall a given day, then each variable in question was assigned the mean value of that variable for the week, rounded off to the nearest whole number. For example, if a subject assigned "anger"

intensity ratings of 3, 2, 4, 3, 5, and 2 for days two through seven, but could not recall the missing data for day one, it was assigned a rating of 3 (which is the mean for the week rounded off to the nearest whole number).

An analysis of variance using repeated measures was performed on all emotion variables using treatment as the between group factor and weeks of therapy as the within group factor. No significant main effects nor interactions were found for the reported intensity of the positive emotions of love, worth, happiness, or security (see Table 3 -- next page).

Table 3

ANOVA TABLES ON POSITIVE EMOTIONS

LOVE

SOURCE	DF	F	p
GROUPS	1	1.03	.34
WEEKS	6	.29	.93
WxG	6	.44	.84

WORTH

SOURCE	DF	F	p
GROUPS	1	.05	.82
WEEKS	6	1.92	.09
WxG	6	.63	.70

HAPPINESS

SOURCE	DF	F	p
GROUPS	1	2.50	.15
WEEKS	6	1.17	.33
WxG	6	.67	.67

SECURITY

SOURCE	DF	F	p
GROUPS	1	.11	.75
WEEKS	6	1.25	.29
WxG	6	.36	.89

Figure 9

Figure 10

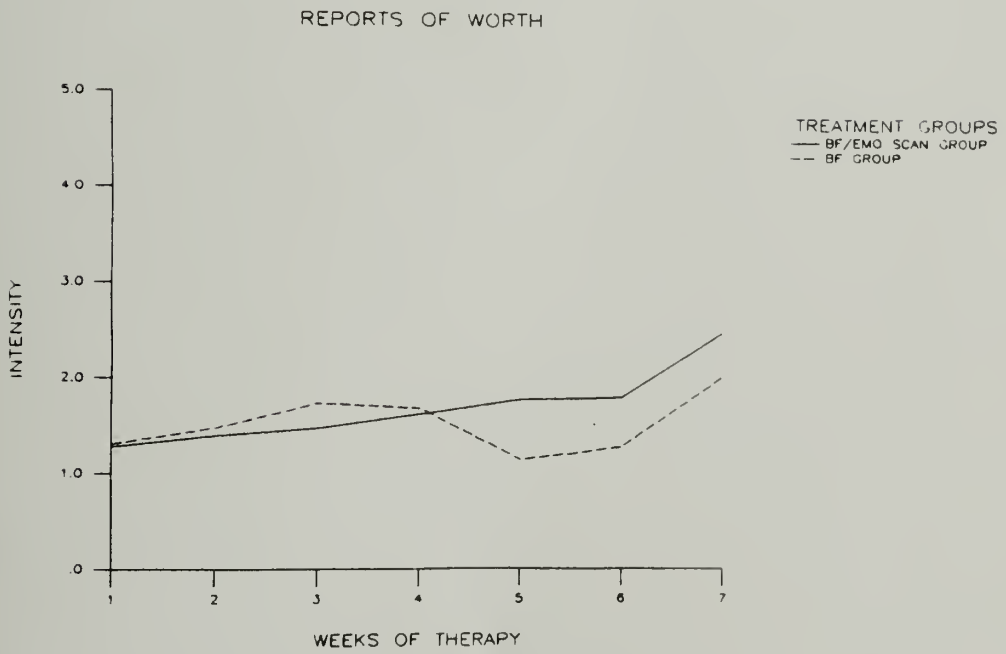


Figure 11

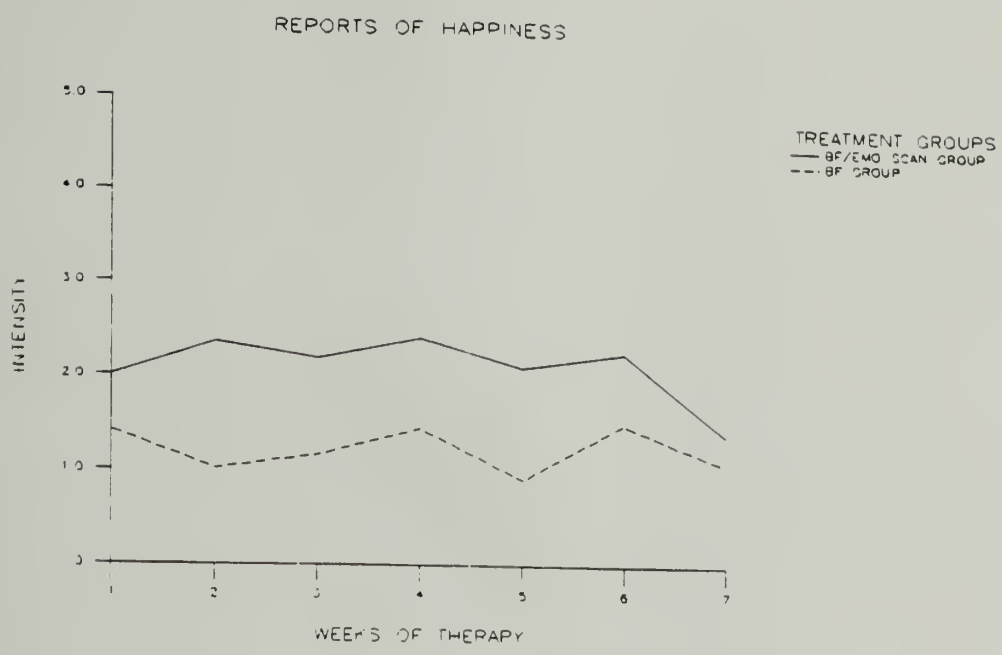
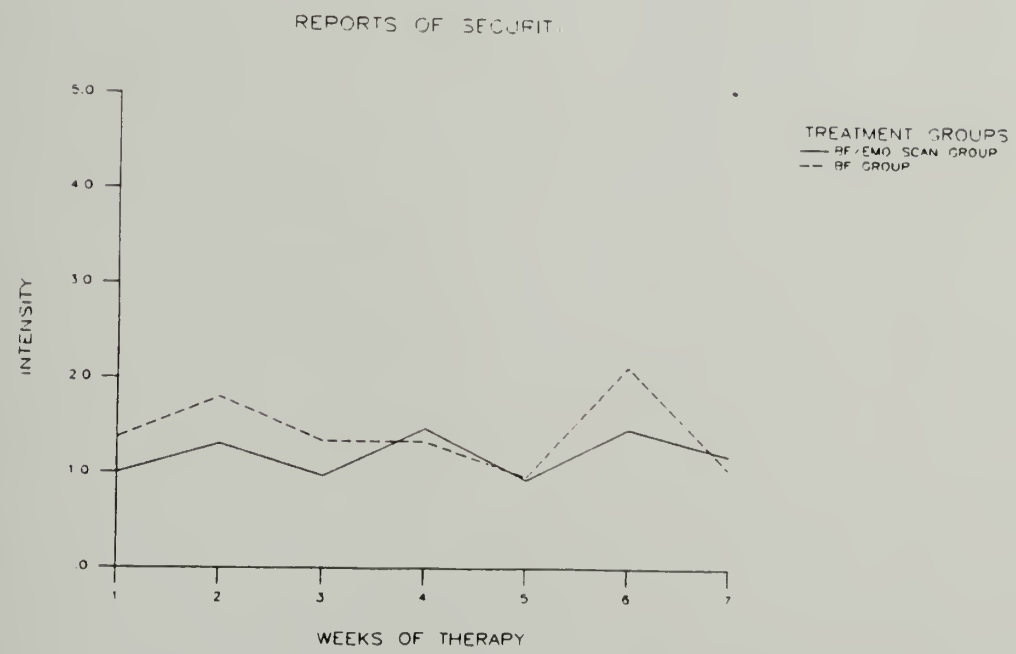


Figure 12



No significant effects were found for the intensity of bodily changes recorded in conjunction with the positive emotions (see Table 4 -- next page).

Perusal of Figures 9 through 16 gives a visual appreciation that there are no clear differences between the two groups in regard to reports of positive emotions and bodily changes.

Table 4

ANOVA TABLES ON POSITIVE BODY FUNCTIONING

MUSCULAR ACTIVITY

SOURCE	DF	F	p
GROUPS	1	1.36	.27
WEEKS	6	1.93	.09
WxG	6	1.08	.38

HEART ACTIVITY

SOURCE	DF	F	p
GROUPS	1	.84	.38
WEEKS	6	.60	.72
WxG	6	.44	.84

THERMAL ACTIVITY

SOURCE	DF	F	p
GROUPS	1	1.23	.29
WEEKS	6	.80	.57
WxG	6	.44	.85

RESPIRATION

SOURCE	DF	F	p
GROUPS	1	1.53	.25
WEEKS	6	1.47	.61
WxG	6	.74	.61

Figure 13

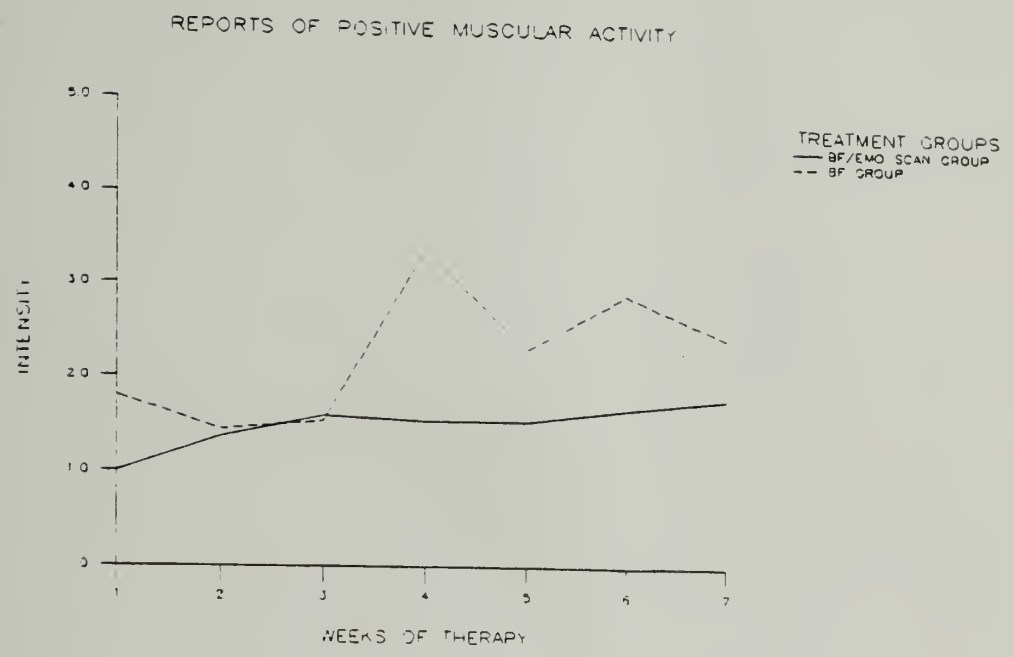


Figure 14

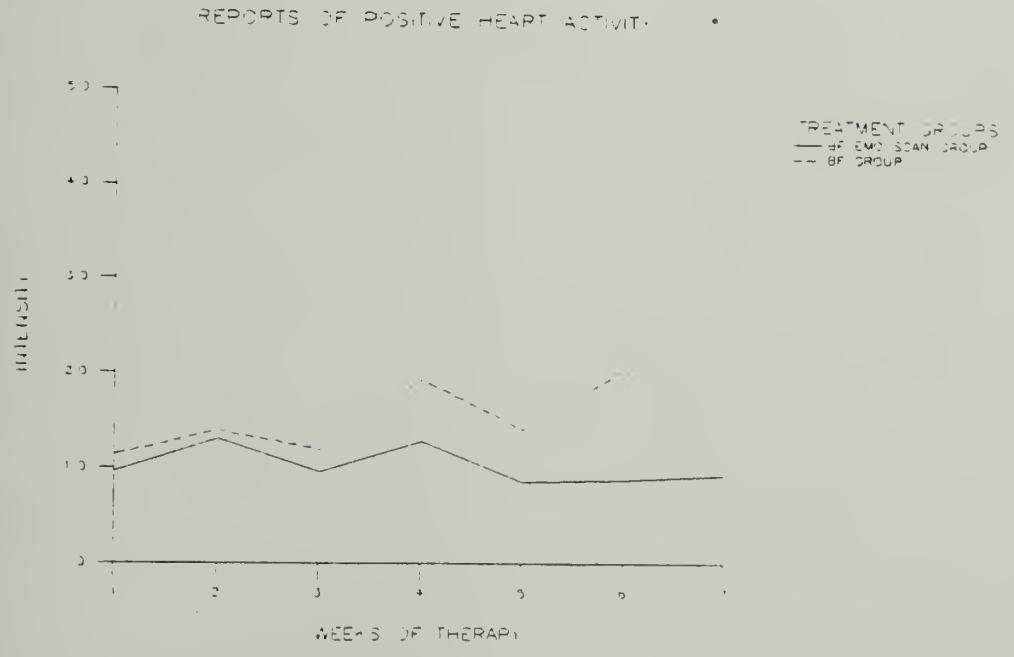


Figure 15

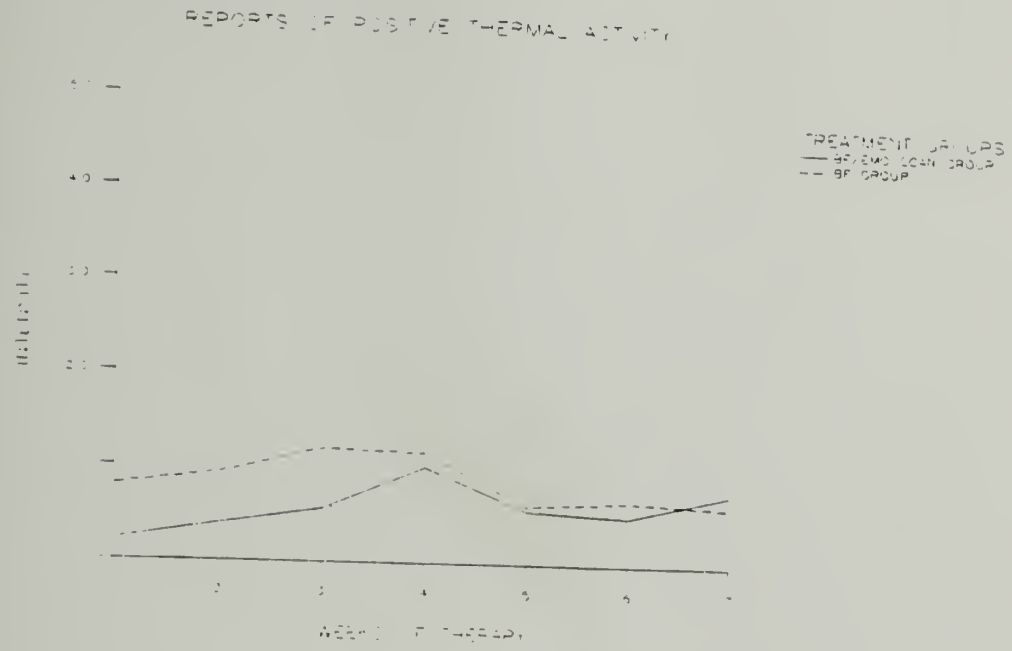
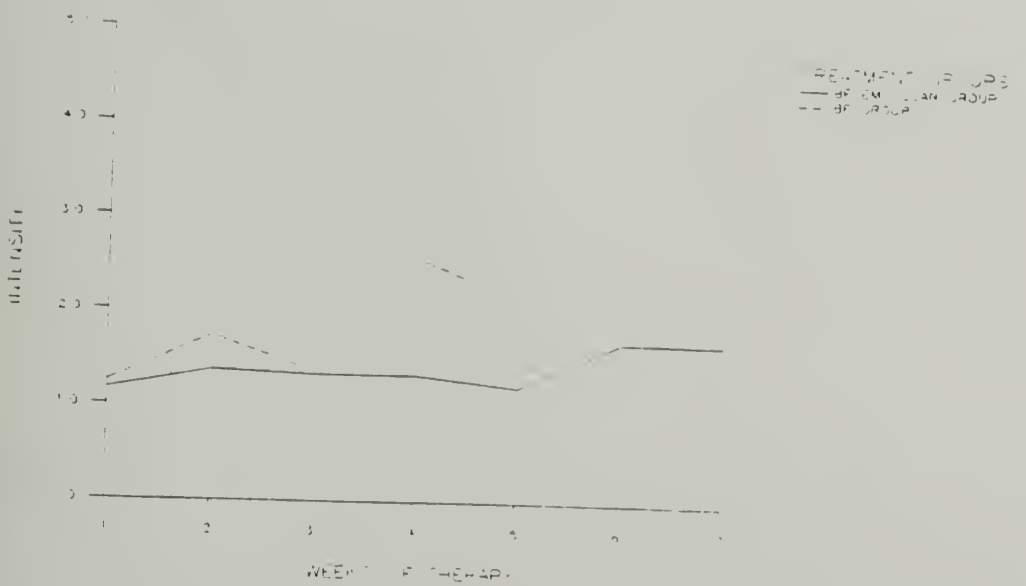
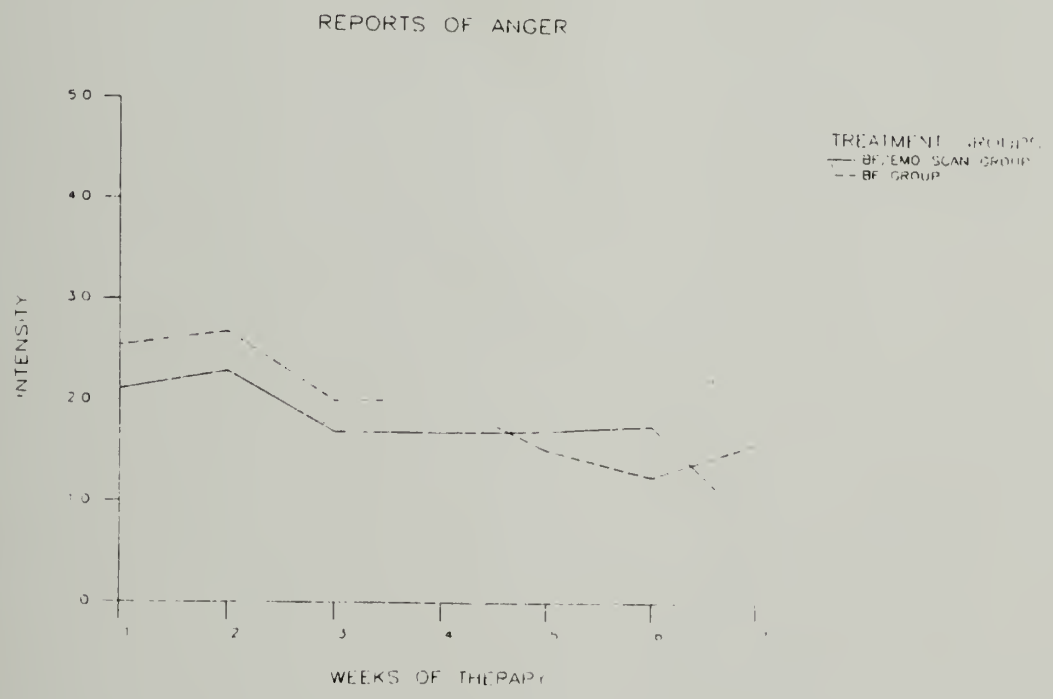


Figure 16



Unlike the positive emotions, the negative emotions of anger, guilt, and anxiety yielded a significant main effect for weeks. The analysis showed that anger, $F(1,6) = 2.78$, $p < .05$; guilt, $F(1,6) = 2.21$, $p < .05$; and anxiety, $F(1,6) = 2.79$, $p < .05$, indicating that both groups showed a significant decline in the intensity of reported negative emotions.

Figure 17



Consistent with the emphasis placed on skeletal muscle control in biofeedback, a significant main effect for weeks regarding reported negative muscular activity

experienced during negative emotions was found: $F(1,6) = 3.84$, $p < .01$, indicating heightened control of skeletal muscle activity was acquired over the training period.

Figure 18

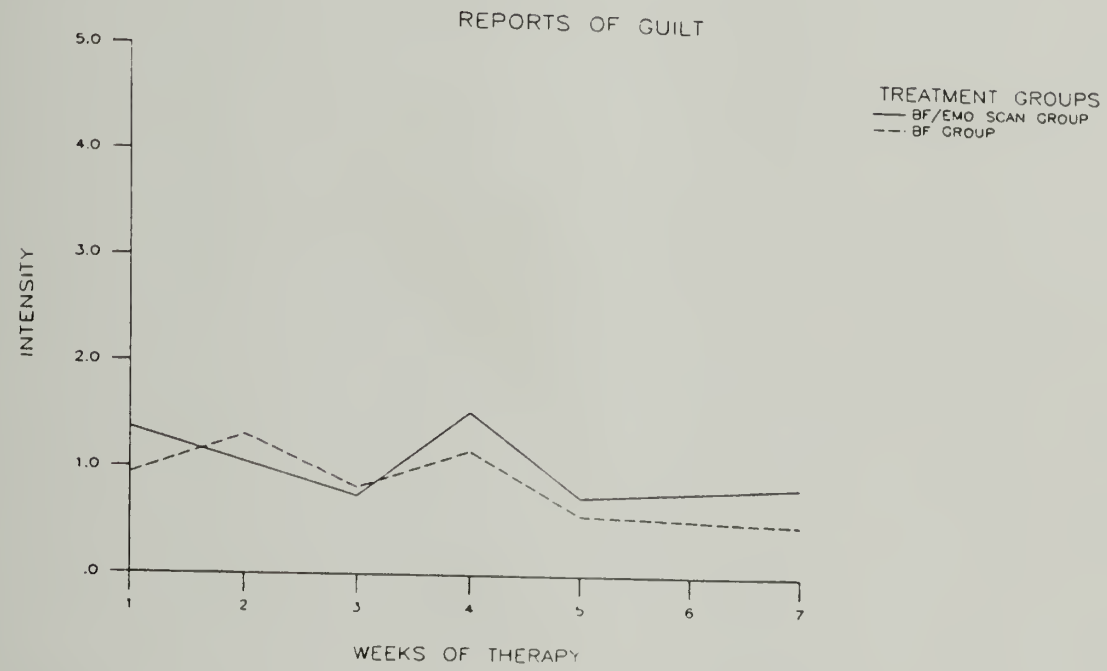
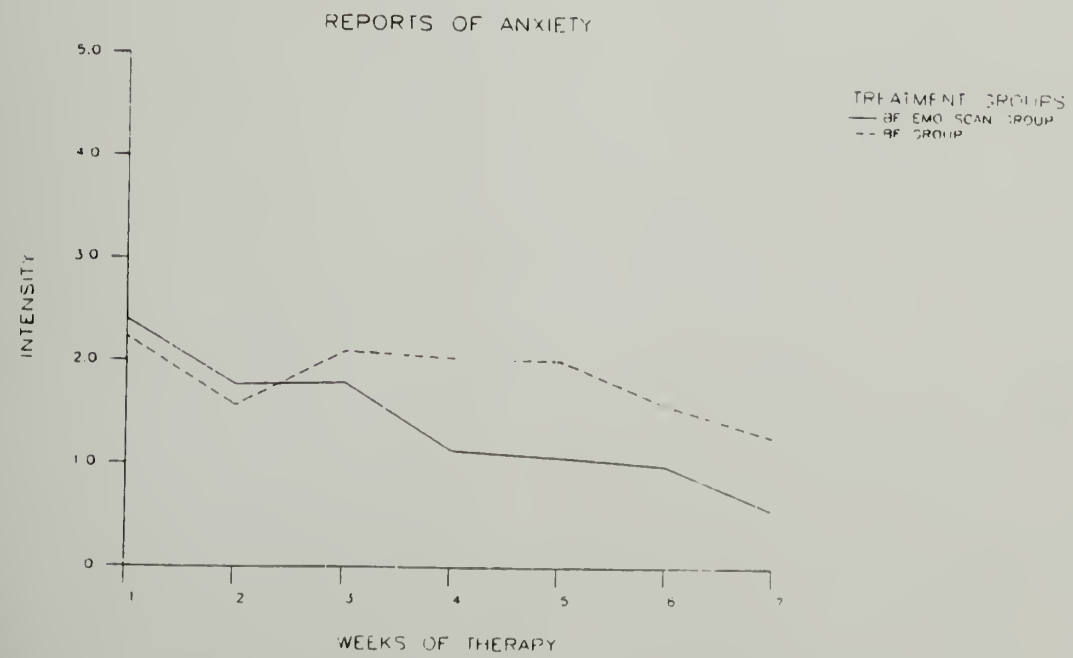
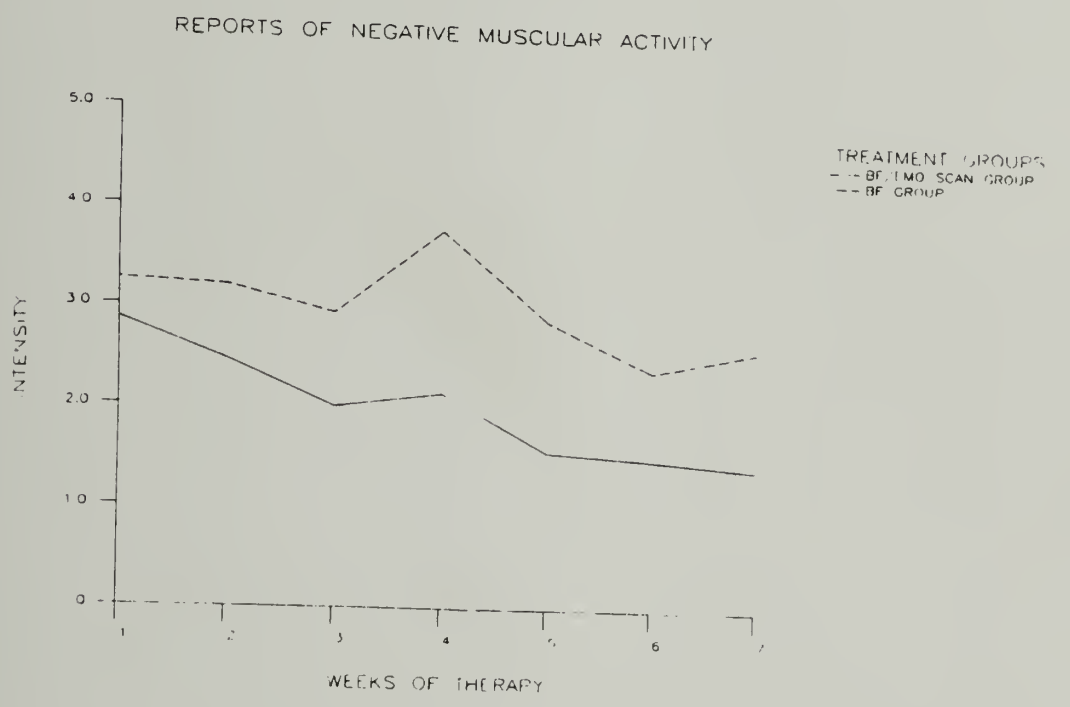


Figure 19



The mean weekly responses of subjects across time for these variables are shown in Figures 17, 18, 19, and 20.

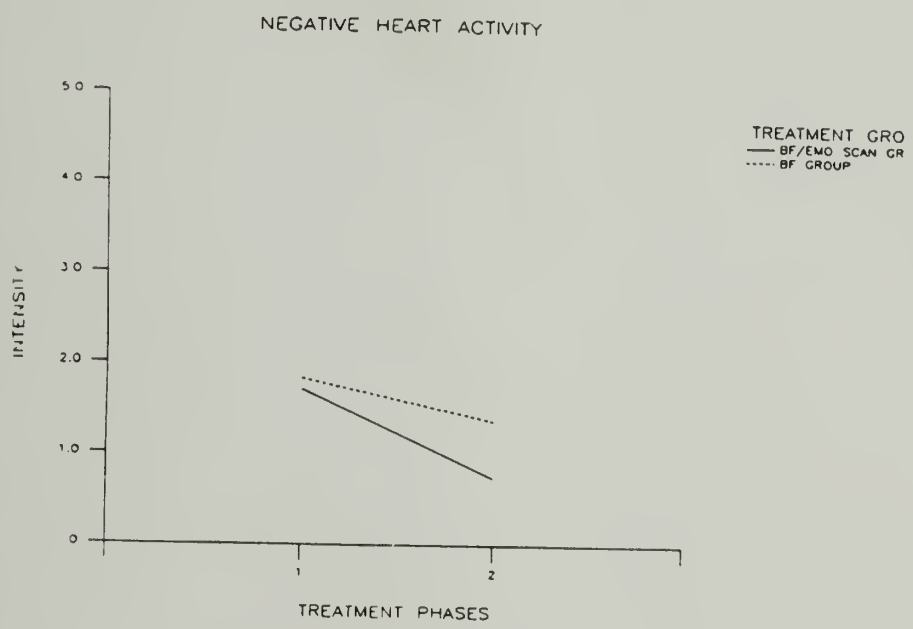
Figure 20



It was of interest to collapse weeks into two distinct time periods representing the first phase of therapy, during which all groups were treated in identical fashion, and the second phase of therapy, during which the experimental group received Emotion Scanning therapy in addition to biofeedback. The main effects previously described continued to be of statistical significance. In addition, negative heart changes (e.g., palpitations) felt

during negative emotions showed a main effect for weeks, $F(1,1,) = 5.68$, $p < .05$, indicating that both groups reported a significant decline in negative cardiac responses over the training period. The changes over phase 1 and phase 2 of therapy in regard to negative cardiac responses can be seen in Figure 21.

Figure 21



A final analysis of variance using repeated measures was performed on the daily emotion data, which divided the phases into 3 distinct time periods, reflecting the initial, middle, and final weeks of treatment. Week

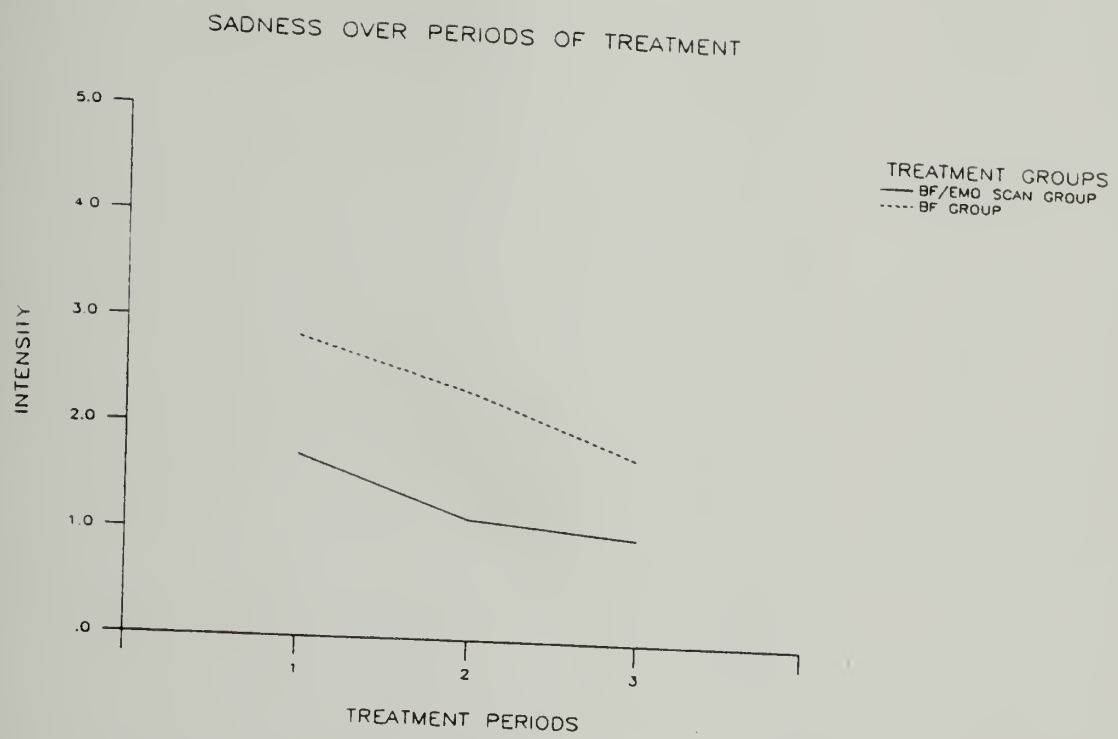
number three of the treatment sessions represented a transitional period for the bf/emo scan group in the sense that they were being introduced to Emotion Scanning techniques for the first time. For this reason, the data for this time slot were dropped from the analysis.

Performing the ANOVA using repeated measures in this fashion produced a main effect for periods in regard to the variable of "sadness", $F(1,2) = 4.15$, $p < .05$, suggesting a significant decline for both groups in the reported intensity of this emotion over the 3 periods of treatment (see Figure 22).

In addition, a main effect for periods in regard to reported positive muscular changes in conjunction with positive emotions was found, $F(1,2) = 3.39$, $p < .05$, suggesting heightened control over positive muscular changes was acquired over the initial, middle, and final periods of training (see Figure 23).

It is of interest that only the single variable of 'positive muscular changes' experienced in conjunction with positive emotions was found to be of statistical significance in terms of the analyses of patients' daily reports of positive emotional reactions. The fact that this single positive emotion variable reflects enhancement

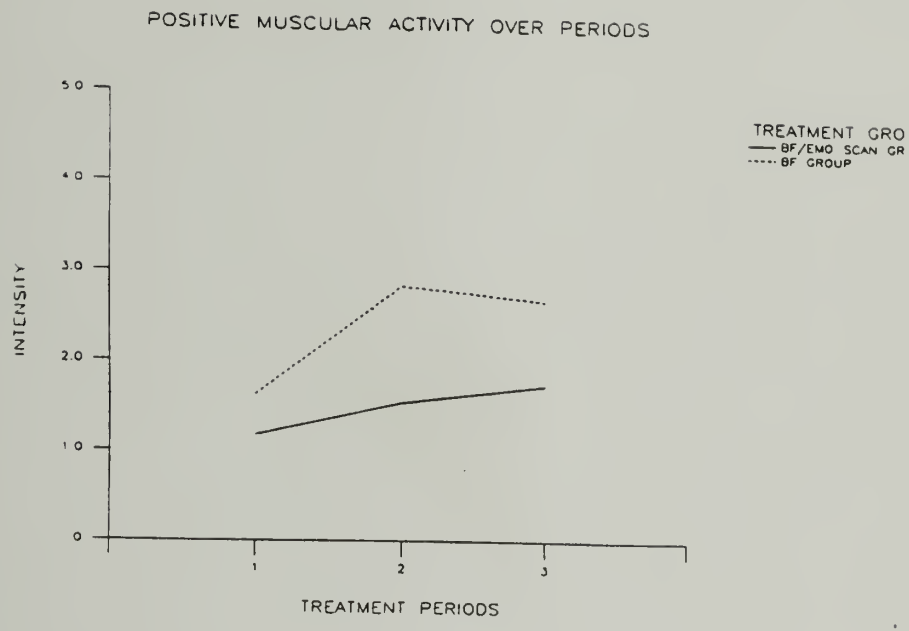
Figure 22



in musculoskeletal activity mirrors the significant finding which was observed for decreased negative musculoskeletal activity experienced concomitantly with negative emotions. Both of these findings are consistent with the emphasis placed on striated muscle activity through the use of biofeedback instrumentation, and the varied use of relaxation strategies aimed at the relaxation of musculature.

No group by week interactions were found to be of statistical significance for any of the above analyses. This may suggest that the Emotion Scanning technique in

Figure 23



addition to biofeedback does not significantly alter patients' evaluations of the intensity of their day-to-day emotions beyond that which is produced by biofeedback alone. This is an interesting finding, and will be discussed in more depth in our discussion of the results.

For the present, a couple of cogent observations may elucidate the types of findings which came to light in the analysis of daily emotion variables.

First, the patients in this study were primarily concerned with their experience of pain, as opposed to emotion. Had we been dealing with a population whose

primary presenting complaint was not, in fact, pain, but who came into therapy with a primary presenting problem of, for example, anxiety or depression, the patients' concern with daily emotions may have taken on greater import.

Second, to the extent that daily emotions were perceived by patients to be an important factor in their overall attempts to gain control over pain experiences, the focus supplied to daily emotional experiences was predominantly confined to the experience of negative, rather than positive emotions.

Third, the daily ratings on emotion variables addressed the experience of emotion, but it did not address the 'meaningfulness' of the emotional experience in a way that allowed for statistical analyses of dimensions beyond the intensity of the emotion itself. For instance, a patient may report feeling quite sad at the peak of a primary emotional reaction to rejection from a loved one. The rated variables assessed in the home charting addressed the intensity of the feeling, but did not address the degree to which the experience of sadness incapacitated the individual. That is, feeling quite sad upon rejection from a significant other is not only reasonable, but expected: and, in fact, the absence of any

negative emotion might be a cause for concern. What becomes important here is not the acknowledgement of strong feelings, but the consequences of those strong feelings. In this instance, there is a clinically significant difference between feeling sad and becoming incapacitated by that sadness, and feeling sad but continuing to function in a manner that allows one to deal with both the event, and one's perceptions of the 'self' (as well as the 'self within the world').

Stated more simply, it is not only reasonable, but healthy to be able to report strong feelings. Emotions are built into our systems and serve as motivators for future action. Thus, it is not the experience of emotion, per se, but what one 'does' with the emotion that is of special interest.

Unfortunately, items specifically addressing dimensions related to the consequences of negative emotions were not assessed. Had they been addressed, my clinical judgement tells me that group by week interactions would have been found, wherein the effects of negative emotions would have been greatly diminished for the bf/emo scan group. In talking with my bf/emo scan patients, I heard numerous accounts relating to how their strong, peak negative emotions ceased to be of an

incapacitating nature. To present a single example, one bf/emo scan subject who was referred for therapy because of cervical pain as a result of having sustained a 'whiplash' injury, developed a phobia about driving. When she first entered therapy, she required her husband to drive her to and from work almost every day. After learning relaxation and being introduced to Emotion Scanning, she told herself three things that allowed her to drive herself to and from work on a regular basis (even though she continued to experience strong anxieties in relationship to driving): "(1) this feeling is not going to kill me, (2) this feeling will pass, and (3) I can control this feeling by relaxing and thinking positive thoughts."

In this one example, we can see that the woman in question might reasonably report strong feelings of anxiety in regard to driving herself to work on any given day, but the consequence of this feeling ceased to manifest itself behaviorally in terms of demanding that her husband drive her to and from her destinations. She acknowledged her strong feelings and then proceded to handle those feelings in an appropriate manner.

This, I think, is the essence of using Emotion Scanning techniques. The goal is not to eliminate

negative emotions, but to teach individuals how to cope more effectively with the negative emotions that they experience. Future research needs to be done that addresses the consequences, or effects of negative emotions when Emotion Scanning therapy is employed.

6.5 Daily Reports of Pain

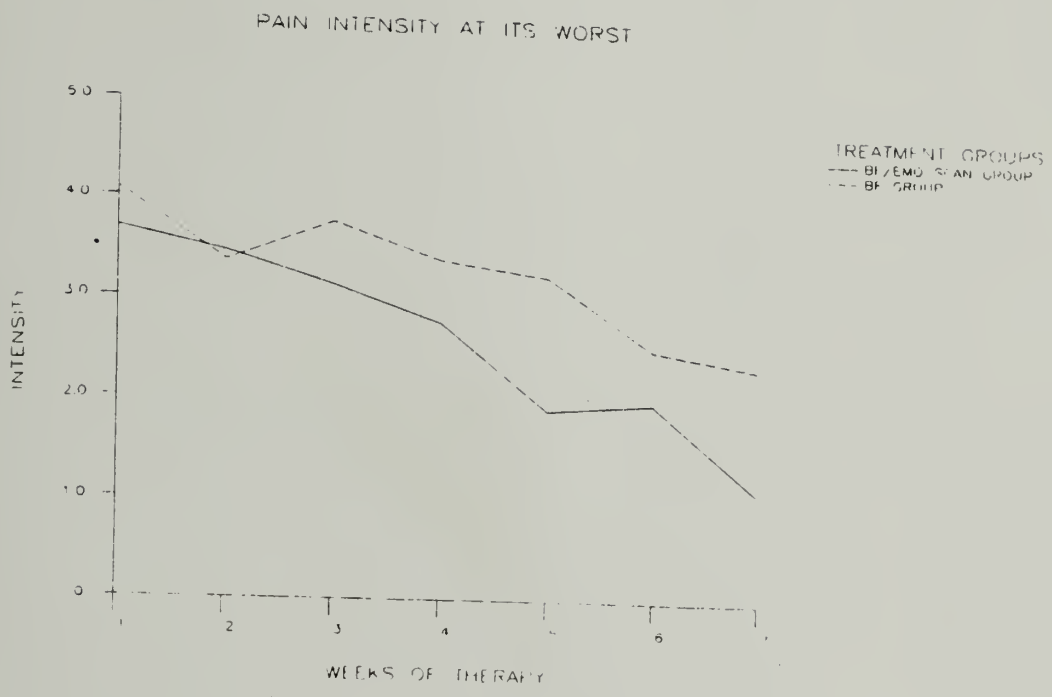
An analysis of variance using repeated measures was performed on all pain variables, again using treatment as the between group factor and weeks of therapy as the within group factor.

As was the case with daily negative emotion variables, a number of main effects for weeks were found in regard to daily pain reports. The variables of interest and their main effects are reported below. This will be followed by figures demonstrating the specific mean responses for the respective findings.

The first variable concerned the reports of intensity of pain experienced at the peak of pain episodes. For this variable, a main effect for weeks was found, $F(1,6) = 8.79$, $p < .01$ (see Figure 24).

Similarly, reported intensity of the least amount of

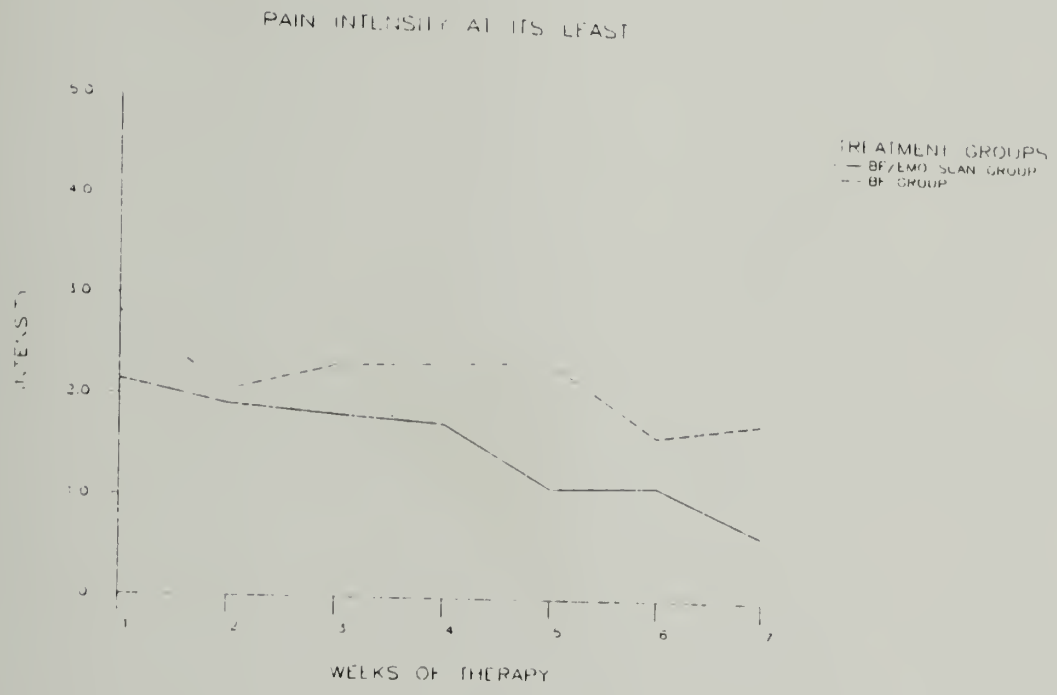
Figure 24



pain experienced within a pain episode showed a significant main effect for weeks: $F(1,6) = 4.38$, $p < .01$ (see Figure 25). Both of the above analyses indicated a significant decrease in reported pain intensity over the course of treatment.

Other main effects for weeks were found for the duration of pain episodes [$F(1,6) = 4.99$, $p < .01$], and the disability experienced as a consequence of pain episodes [$F(1,6) = 6.83$, $p < .01$.], again suggesting that both groups improved in regard to these pain variables.

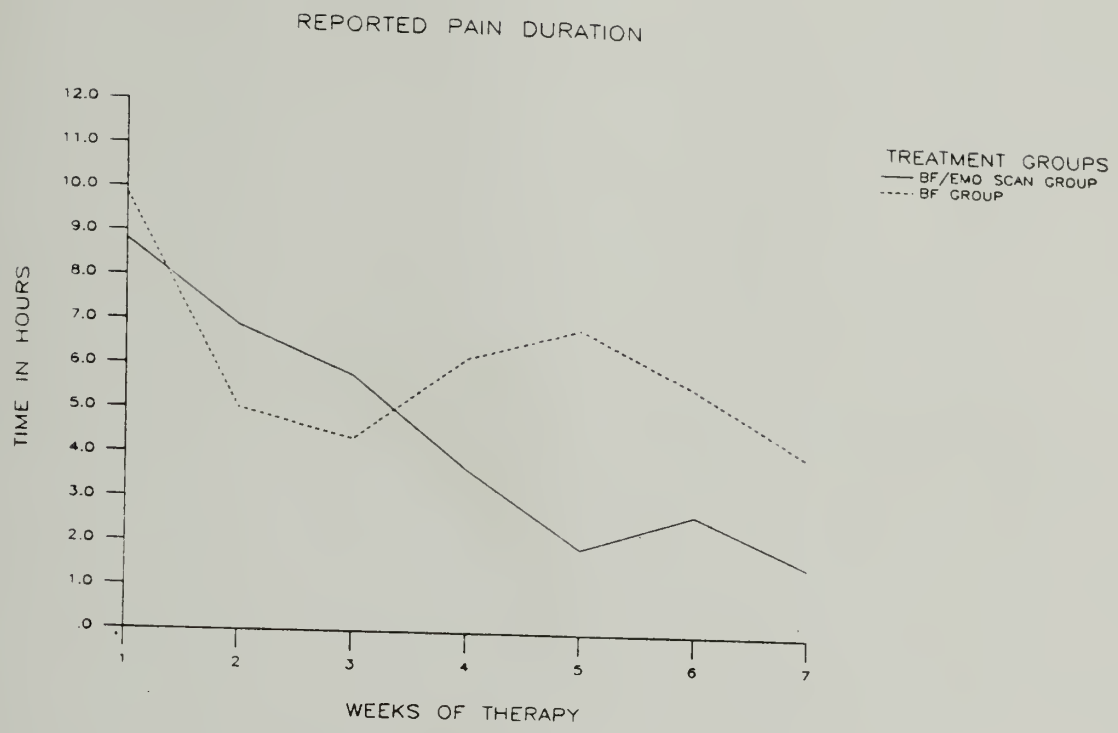
Figure 25



In addition to the above pain variables, we also examined the patients' emotional reactions experienced both before and during pain experiences. Here, again, a number of main effects for weeks were found:

Degree of reported anxiety experienced before the onset of pain diminished significantly over time : $F(1,6) = 4.97$, $p < .01$. So, too, the amount of anxiety experienced during pain episodes showed significant declines: $F(1,6) = 5.66$, $p < .01$.

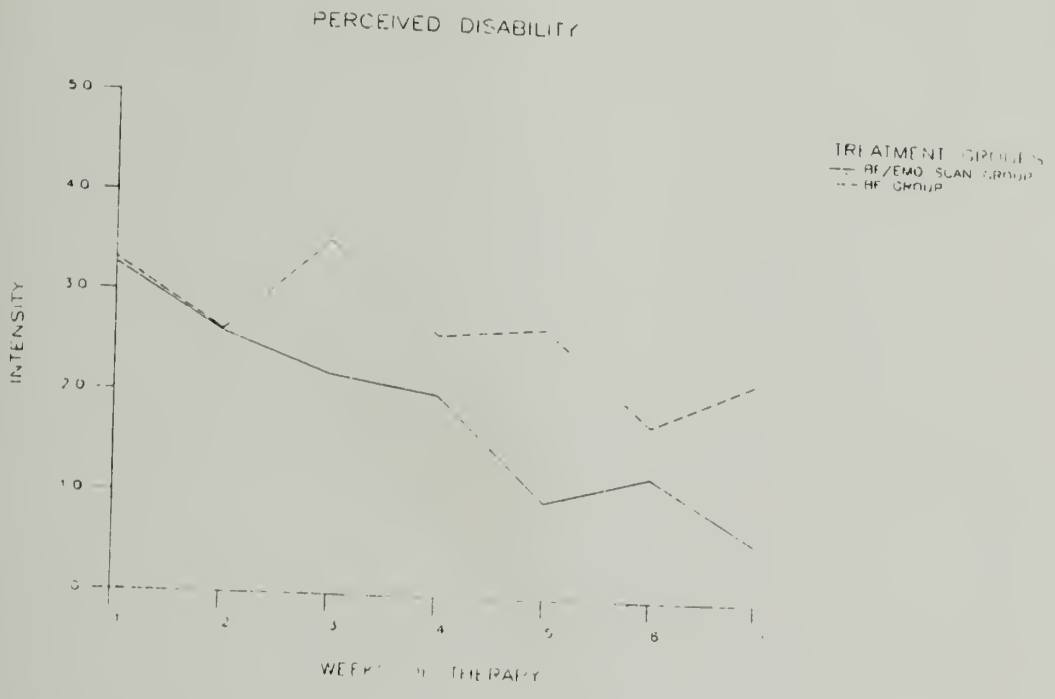
Figure 26



The degree of sadness experienced both before and during pain episodes revealed a significant main effects for weeks. For the degree of sadness experienced before a pain episode, $F(1,6) = 4.87$, $p < .01$. For the degree of sadness experienced during a pain episode. $F(1.6) = 6.14$. $p < .01$. The direction of both of these findings indicated a significant decline in reported sadness over the course of therapy.

Anger experienced before a pain episode showed a

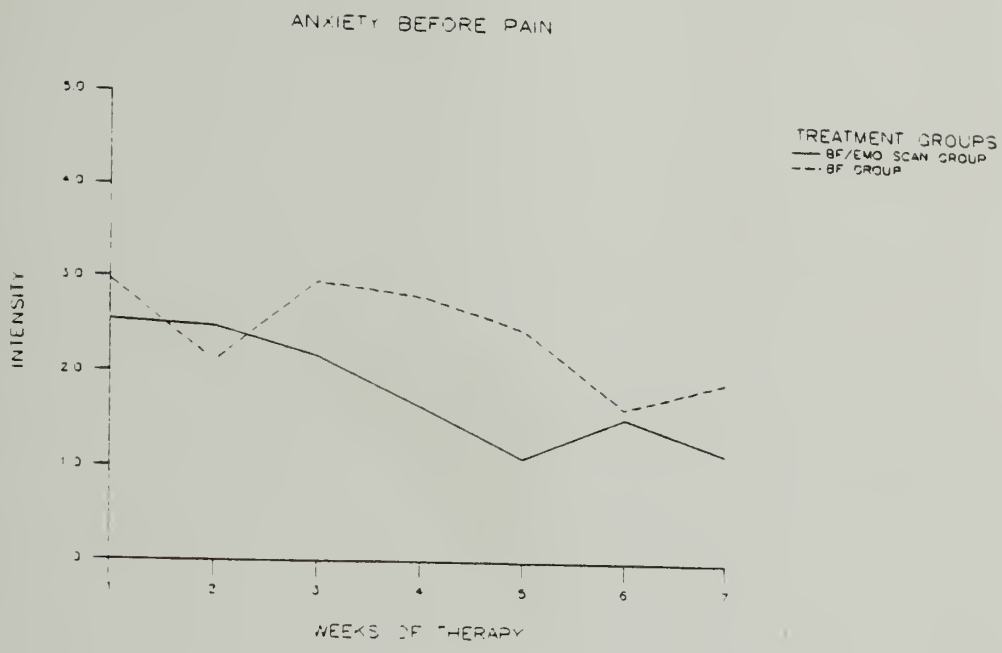
Figure 27



significant main effect for weeks of $F(1,6) = 5.21$, $p < .01$. Anger experienced during a pain episode showed a main effect for weeks of $F(1,6) = 8.03$, $p < .01$: again, both indicated significant declines in reported intensity for these dimensions.

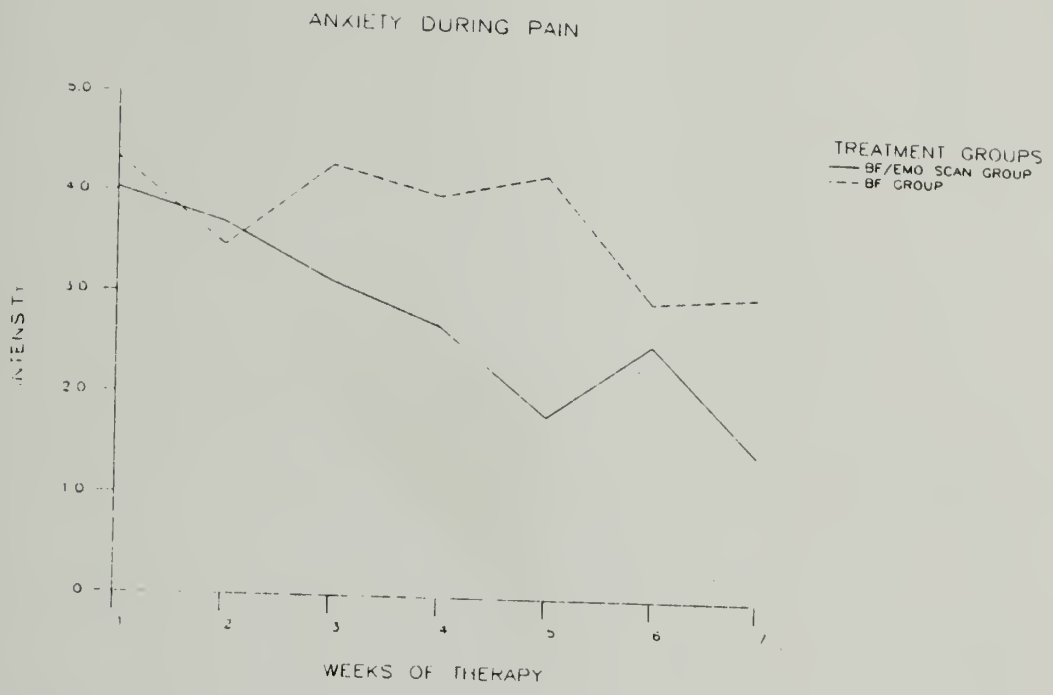
Finally, guilt experienced before a pain episode was found to have a main effect of $F(1,6) = 5.24$, $p < .01$, and guilt experienced during a pain episode was found to have a main effect of $F(1,6) = 7.56$, $p < .01$.

Figure 28



It was not surprising to find the above main effects for groups over time because both biofeedback alone and biofeedback in conjunction with Emotion Scanning were presumed to be effective in the treatment of psychosomatic pain syndromes. A question, however, remained as to the overall effectiveness of biofeedback combined with Emotion Scanning compared to the effectiveness of biofeedback therapy alone. Thus, we were concerned with not only main effects, but with the interaction of treatment-groups by weeks of therapy. In this regard, a number of

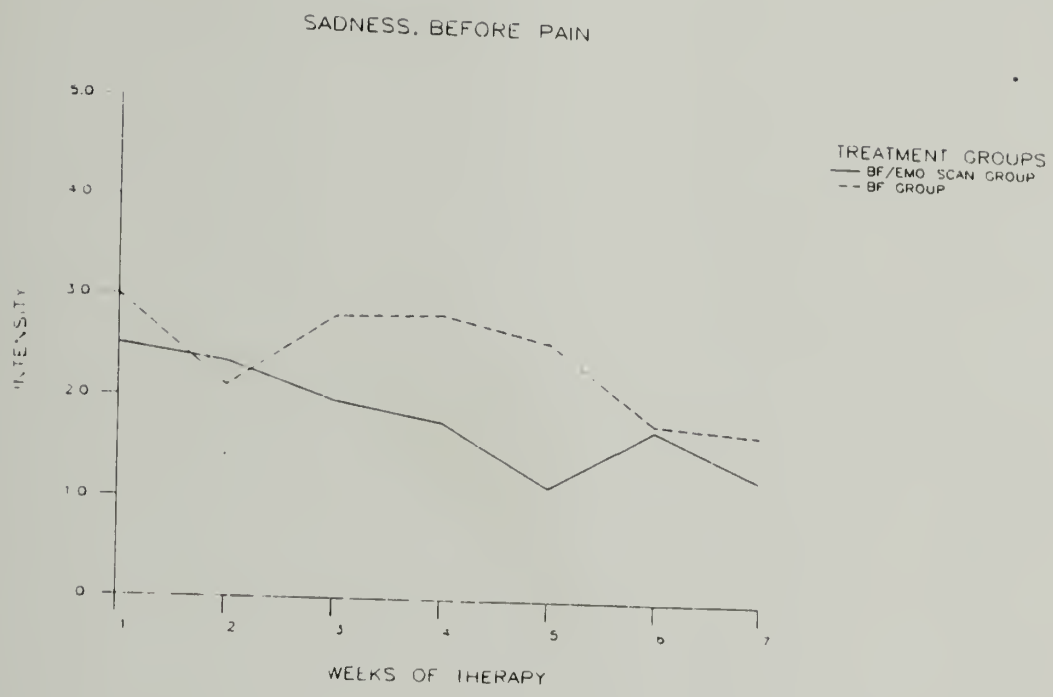
Figure 29



interactions were found in regard to the emotionality experienced between the groups over the course of therapy. These findings are as follows:

First, the degree of anxiety experienced before a pain episode showed an interaction effect of borderline statistical significance; $F(1,6) = 2.03$, $p < .07$. This interaction became significant at the .05 level when analyzed in terms of the initial, middle, and final two weeks of treatment: $F(1,2) = 3.53$, $p < .05$ (see Figure 36).

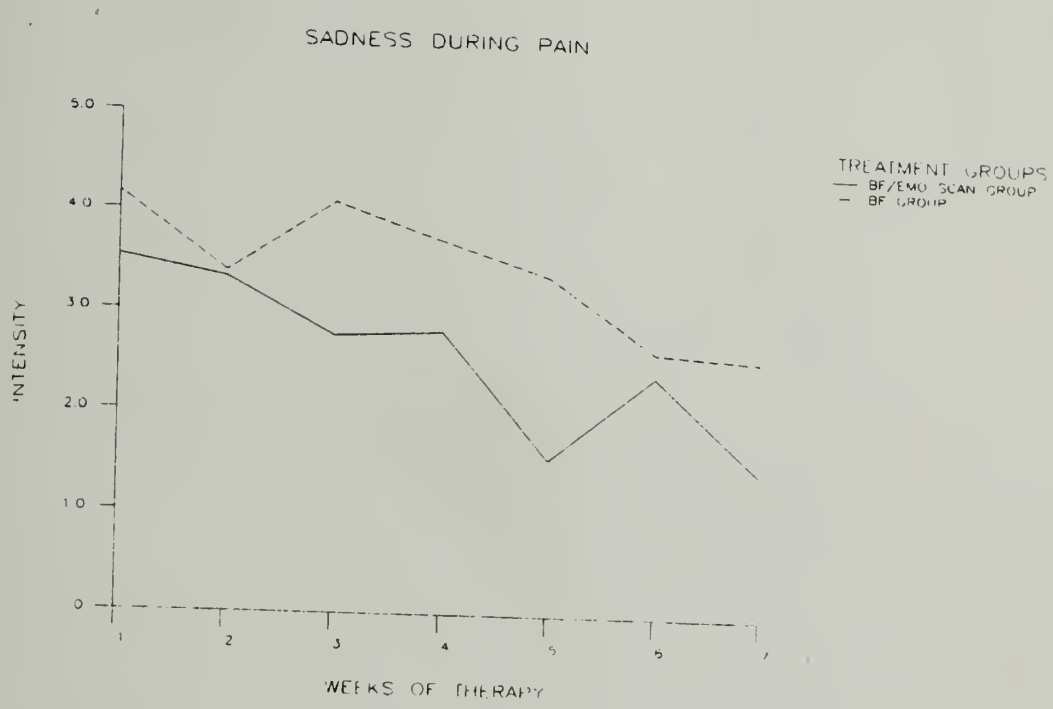
Figure 30



Anxiety experienced during a pain episode had interactional effects as well: $F(1,6) = 2.83$, $p < .05$. Another interaction was found for sadness experienced before a pain episode [$F(1,6) = 2.23$, $p < .05$]. Interactional effects in regard to guilt experienced during pain episodes was found to be of borderline significance: $F(1,6) = 2.09$, $p < .07$.

As can be seen in Figures 28, 29, and 30, representing mean weekly responses for the reported intensities of anxiety before pain, anxiety during pain,

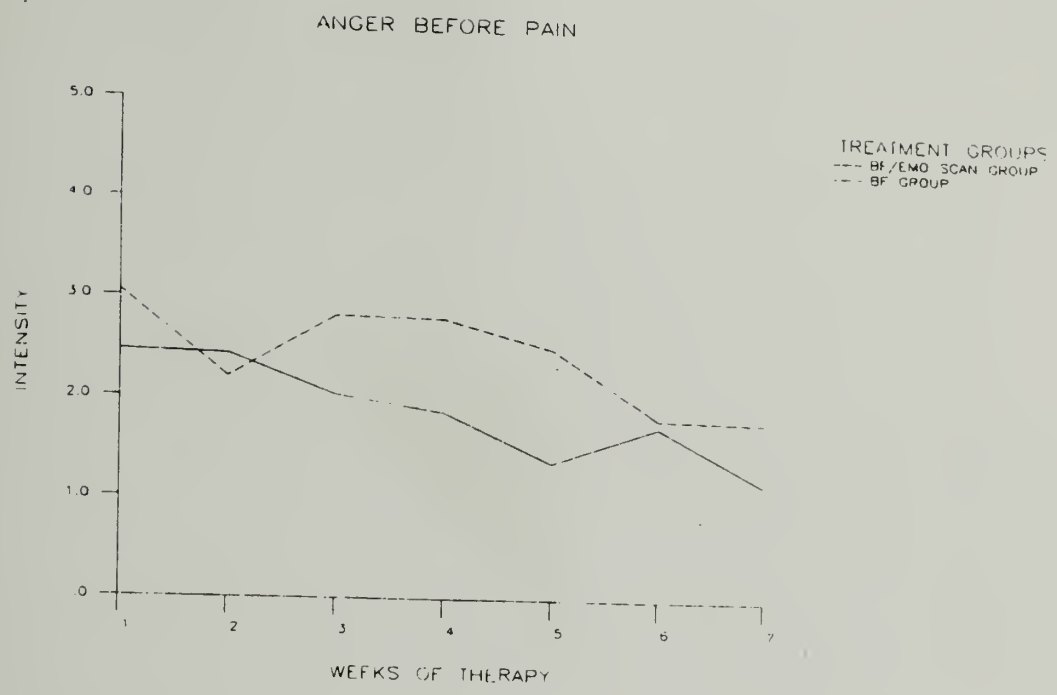
Figure 31



and sadness before pain, the form of the curves are all quite similar. For the bf group there is a drop in the reported intensities of these pain-related emotions on week two, which is followed by a resumption of reported intensity that approaches the levels of week one. Thereafter, the decline in reported intensities is fairly gradual. It more or less evens out on the last two weeks of therapy.

The bf/emo scan group does not demonstrate a rapid decline on the second week. Instead, they show a fairly gradual and steady decline until week five, at which point

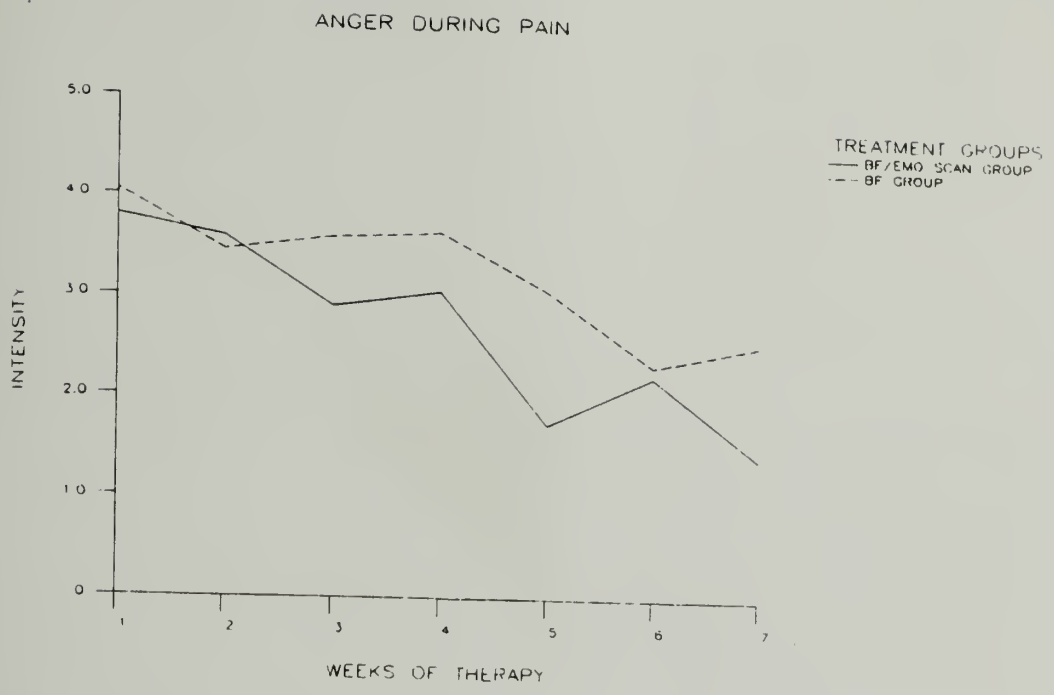
Figure 32



the drop is slightly more dramatic (especially in the reports of sadness experienced before pain, and to a lesser extent for the anxiety reports). Week six for this group shows a sudden increase in reported intensity levels that approach the levels reported on week four, and this is followed by a decline again on week seven.

The sudden decline in reported intensity observed on week two for the bf group may represent a "learning" or "anticipation" effect. It is not unusual in clinical practice to encounter sudden reports of "cure" by patients in the early stages of treatment. These reports are

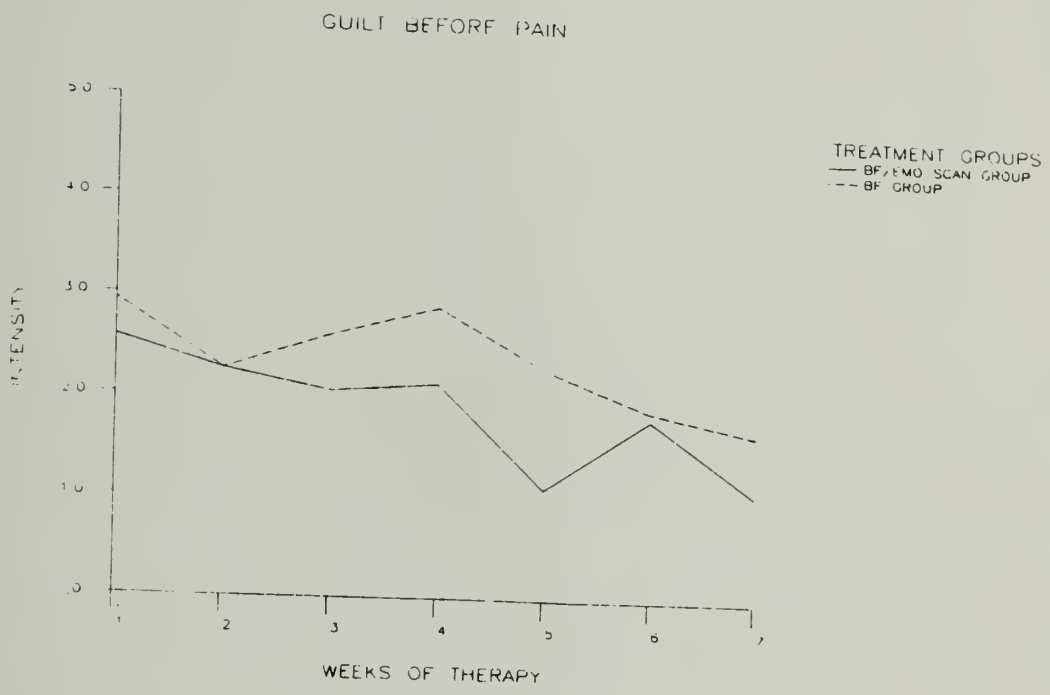
Figure 33



normally short-lived, and are apparently the product of the patient's initial enthusiasm for entering therapy.

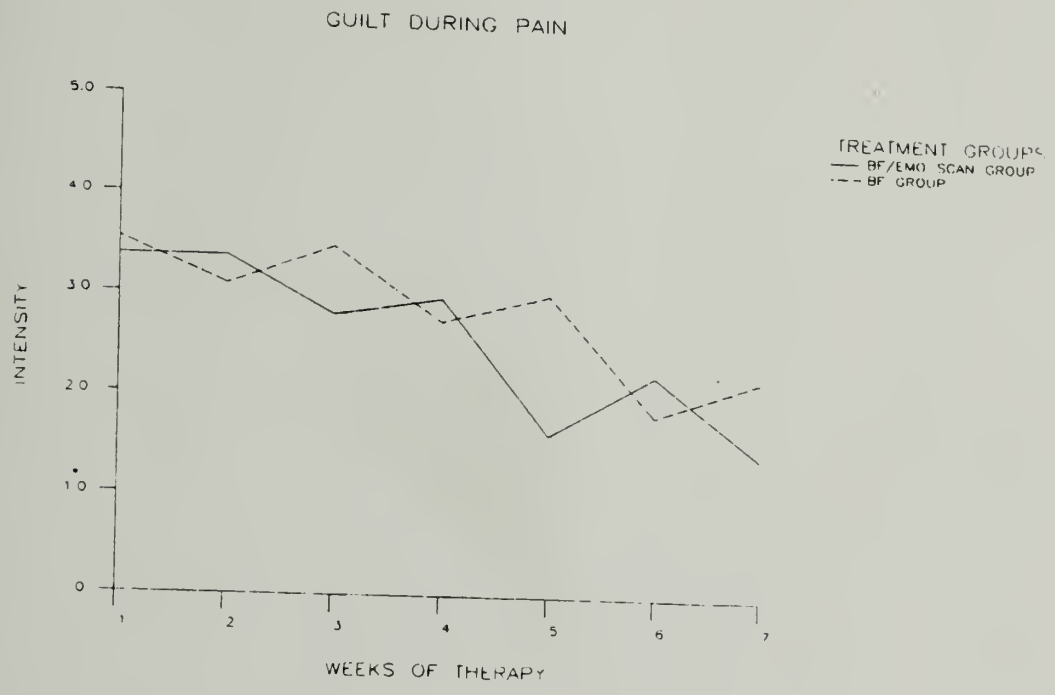
If this was the case in the present study, a question then arises as to why the bf/emo scan group did not demonstrate the same phenomenon. The answer to this question, I suspect, lies in the fact that no deception was used in the orientation to therapy which all patients received. Thus, the bf/emo scan group knew that an additional form of therapy (i.e., Emotion Scanning) was due to come in the weeks ahead. For this reason, they may have been more conservative in their initial enthusiasm

Figure 34



for therapy until they encountered all the facets of the treatment program. While the decline on week five for the bf/emo scan group is less dramatic than the decline observed on week two for the bf group, the resumption to previous levels of reported intensity on week six does appear to parallel the situation observed earlier for the bf group. Whether the above interpretation of the forms of these curves is correct will require further research that specifically addresses that question. Less speculative, and more obvious is the fact that the bf/emo scan group is definitely reporting less intense discomfort

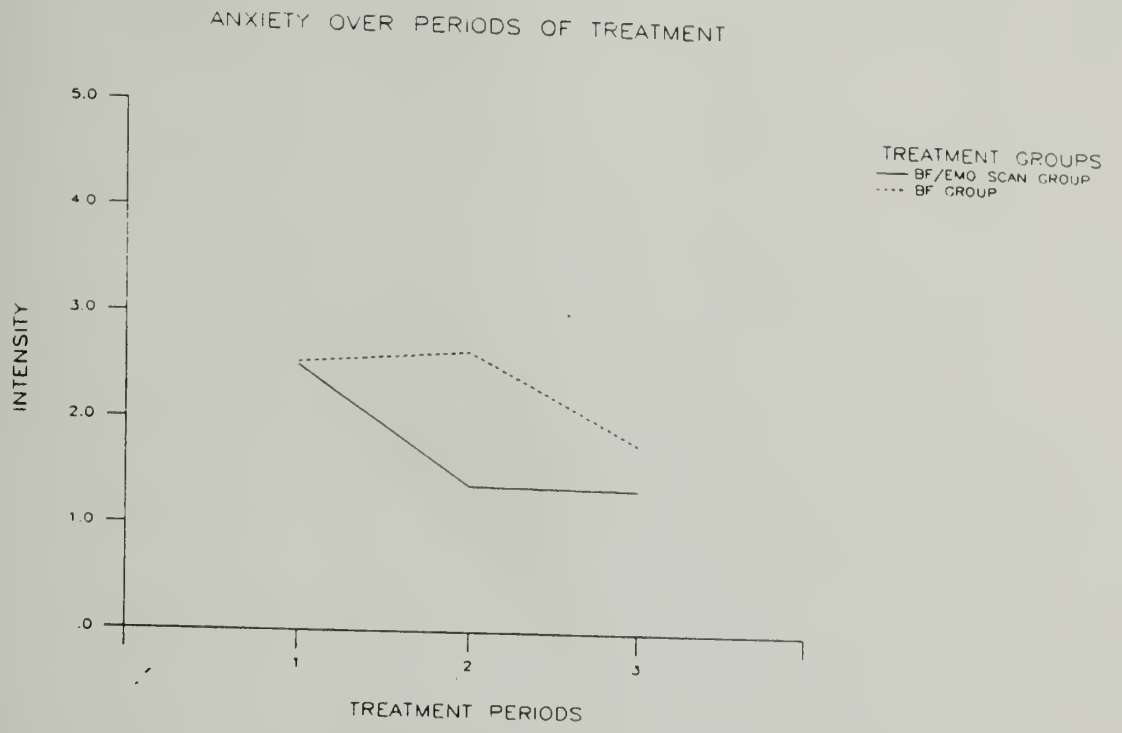
Figure 35



as far as the experience of pain-related emotions are concerned than is the bf group.

Figure 35 shows the mean weekly responses for both groups in terms of the intensity of guilt feelings experienced during pain episodes. The form of the curve representing the bf/emo scan group's responses is similar to that observed above, except that the decline is much slighter during the first half of therapy and the drop during week five is much more dramatic. The form of the curve for the bf group has a saw-tooth effect that does not appear to be the product of anything other than

Figure 36



patients' varied feelings which were likely more subject to the events in their lives than anything related to therapy.

Guilt is a special emotion in regard to pain due to its relationship with other emotions. That is, guilt appears to be less a product of the pain experience, and more a product of how the individual responds to pain. For instance, a patient may experience increased irritability during a pain episode and mistreat his or her child as a result. The guilt, then, results from the inappropriate behavior rather than the pain itself. Or, a

patient might experience pain on one occasion, to which the spouse responds in a helpful and solicitous manner. On the next occasion of a pain episode, the spouse may respond in an accusatory or recriminatory manner. In this case, the degree of guilt experienced by the patient is subject to the responses of significant others. In both of these cases, the experience of guilt is, in a sense, one step removed from the pain itself.

With this in mind, the group curves representing mean reports of the intensity of guilt felt during pain episodes demonstrate a meaningful difference. The intensity reports of guilt communicated by the bf group do not coincide in any meaningful fashion to the treatments employed in therapy, suggesting that their guilt emotions were primarily a product of factors not specific to the course of therapy. The bf/emo scan group, however, presents a curve that is quite similar to other bf/emo scan curves representing pain-related emotions, and suggests that their experience of guilt is reflective of the course of treatment that they received.

This is an important consideration, for in the use of Emotion Scanning, one is helping patients to accept responsibility for their own emotions. This is a difficult premise for patients to accept because many of

them have long felt victimized, or controlled by their emotions -- as if emotions were "things" outside of their control and which "took over", "overwhelmed", or "filled" them in some uncomfortable manner. By taking responsibility for one's own emotions, one is, by implication, taking responsibility for one's own actions. This is a risky proposition, and if forced upon the individual, can prove to be quite threatening.

For this reason, the differential group reports of guilt experienced during a pain episode is of substantive interest. It suggests (perhaps more than anything else) that the bf/emo scan group was learning to accept responsibility for their emotions. In contrast, the bf group's experience of guilt continued to be primarily a product of happenstance. While they did report decreases in pain-related emotions, such decreases were probably the result of their learned control over pain and physical stress.

Without denigrating the importance of learning to control pain and stress from a biofeedback and relaxation perspective, it should be noted that the individual's emotional experiences are still vulnerable to factors which are external to the person. Contrast this form of control with the individual who not only learns to control

pain and stress by means of relaxation strategies, but who acquires more specific control over emotional experiences by incorporating cognitive intervention techniques.

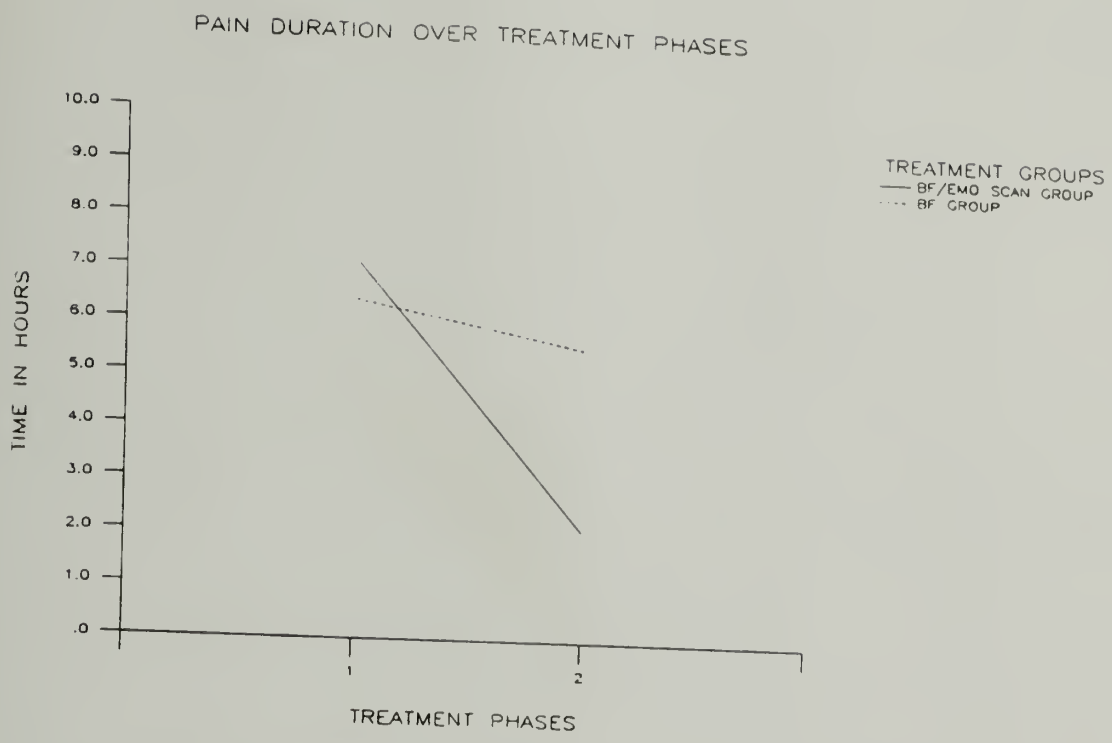
In the above analyses, we have found that biofeedback in conjunction with Emotion Scanning therapy is superior to biofeedback alone in regard to specific negative emotions experienced before and during pain episodes. We have not evaluated, thus far, the extent to which biofeedback in conjunction with Emotion Scanning is superior to biofeedback therapy alone when the variable in question is directly related to (non-emotion) pain variables.

In a fashion identical to that used in analyzing the daily reports of peak emotional experiences, we compared the first phase of therapy during which all subjects were treated in the same manner to the last phase of therapy during which the bf/emo scan group received Emotion Scanning Therapy in addition to biofeedback therapy. When this analysis was performed, an additional interaction became apparent. While both the biofeedback group and bf/emo scan group reported significant declines in the duration of pain episodes over time, the bf/emo scan group reported signficantly less duration of pain episodes over time as compared to the biofeedback group. The

statistical significance of this interactional effect was found to be the following: $F(1,1) = 6.38$, $p < .05$. As can be seen in Figure 37, the bf/emo scan group is reporting significantly fewer hours of actual pain over the last half of therapy when they are receiving Emotion Scanning therapy, in comparison to the bf group who did not receive such therapy. This is quite important for it suggests that Emotion Scanning therapy not only results in less emotional distress in association with pain, but actually serves to affect the more objective dimension of time spent in pain.

This last finding is of particular interest. The experience of pain is quite difficult to objectify. That is, pain experiences are evaluated primarily in terms of subjective reports related to perceived intensity, perceived disability, and perceived emotionality related to pain. The duration of reported pain episodes, however, is somewhat more objective. Regardless of the perceived precursors to pain and the perceived consequences of pain, both of which are influenced by patients' attitudes toward pain experiences, the duration of pain episodes is much more directly connected to the experience itself. That is, a patient may exaggerate or diminish the experiences

Figure 37



of pain intensity, pain-related disability, or pain-related emotionality depending on the attitudes toward pain, and/or the secondary gain features associated with pain. However, most patients appear to be able to distinguish on a more objective level the difference between the presence of pain and the absence of pain, per se. Hence, the finding of an interactional effect between groups on the dimension of duration of pain episodes suggests that Emotion Scanning not only benefits the patient in terms of the subjective experience of pain-related emotionality, but actually influences the

amount of objective time in an individual's day which is connected with pain experiences.

C H A P T E R VII

DISCUSSION

7.1 ASSUMPTIONS

The combined use of biofeedback and Emotion Scanning therapy proved to be beneficial to patients, and had greater therapeutic value than the use of biofeedback therapy alone. In discussing the many details that are contained in the findings, there are four assumptions that need to be kept in mind. These four assumptions provide the underpinning of a theoretical framework within which the hard data and clinical observations are meaningfully organized. These four assumptions are the following:

(1) A fundamental function of emotions is that they serve to motivate the organism toward action. According to Epstein, a primary emotion is "...a complex physiological and behavioral response pattern...that is associated with a specific action tendency, a specific state of receptivity to stimulation, a specific pattern of physiological arousal that is supportive of the other

states, and often with a specific pattern of expressive behavior" (1982). In addition to the above, he includes in his definition an affective or feeling component in primary emotions (personal communication).

(2) In evaluating the adaptive nature of emotion, a clear distinction needs to be kept in mind between the emotion and the quality of the pleasure or pain associated with it. The dimension of pleasure/pain is not the same as emotion. The emotion of rage, for instance, may be either painful or pleasurable.

(3) Organisms do not respond to events in a vacuum. There are numerous hormonal, humoral and electrochemical response factors and proclivities at work in addition to the intrapsychic mechanisms present. I would like to propose in this context that initial states exist which serve as filters through which events are organized.

In psychological terms, this principle of initial states is aptly described by Epstein in his proposal of "personal theories of realities" (Epstein, 1973, 1980; Epstein and Erskine, 1983). According to Epstein, individuals formulate implicit theories of reality because they need such theories in order to make sense out of daily experience. A personal theory of reality consists of sub-theories related to the "self" and the "world".

In physiological terms, the principle of initial states can be understood in two respects which are relevant to the present study. First, in the gate control theory proposed by Melzack and Wall (1965, 1982) and Wall (1984), afferent activity is influenced by efferent systems that affect input transmission. Second, internal states as determined by central excitatory and inhibitory states, and also by humoral and hormonal states (what the French school of physiological thought refer to as the milieu interior) powerfully affect and in fact can entirely change organismic and behavioral reactivity to physically identical stimuli.

(4) Finally, the psychological and physiological components that go into the establishment of initial states are not fixed, but can be changed by experience. We shall refer to this as the principle of plasticity.

In psychological terms, I again make reference to Epstein's proposal of a personal theory of reality. Personal theories serve the function of assimilating information into a coherent conceptual system, maintaining a favorable pleasure-pain balance, and optimizing the level of self-esteem. When information is received that threatens the individual's self and/or world assumptions, the individual has the option of repressing the

information, distorting the information, changing the situation related to the information, or changing the assumptions which are in conflict with the information.

In physiological terms, the concept of neural plasticity is highly relevant, and well demonstrated. According to this theory, neurological connections in the brain are created, strengthened, or weakened according to the quality and quantity of prior exposure to stimuli (see, for instance, "Plasticity -- The Mirror of Experience", Spinelli and Jensen, 1979; "Plasticity experience and resource allocation in motor cortex and hypothalamus", Spinelli and Jensen, 1982). Such plasticity is not confined to dendritic connections within the grey matter of the brain. It has also been shown to occur in the spinal column (see Wall, 1984). Further, there is substantial evidence that synaptic sensitivity to various neurotransmitters can be altered by previous experience (see Akiskal, 19_).

7.2 PLASTICITY IN PSYCHOSOMATIC PROBLEMS

The "plasticity" or potential for change, which we rely on as therapists to set the stage for creating a more

adaptive "initial state", is the same plasticity (or potential for change) which resulted in the maladaptive initial state first observed.

Substantial psychological or physiological change is not come by easily. Change is gradual and requires hard work by both the patient and therapist. Changing construals or automatic thoughts in response to an event requires more than an intellectual appreciation of alternative cognitive response patterns. So, too, changing one's physiological responsivity requires more than an intellectual appreciation of relaxation processes. Each of these domains of intervention requires practice both inside and outside of the office environment.

In our population of patients it was found that at first the change was consciously initiated. That is, the patient had to consciously decide to intervene in the emotion reaction.[1] In this regard, negative emotionality is taught to constitute a cue or signal to

[1] This decision to act upon the emotional experience, in itself, afforded immediate but temporary relief. This was manifested by the bf group's immediate, albeit temporary expression of reduced negativity in the beginning stage of recorded therapy. There was also an immediate, but temporary expression of reduced negativity in the beginning stage of Emotion-Scanning therapy by the bf/emo scan group.

impose one's learned strategies for coping. The initial experience of the emotion was not necessarily changed, but the means of coping with the emotion did; ergo, the consequences of the negative emotion were altered in a therapeutically beneficial direction.

There are somewhat specific desiderata in optimizing therapeutic management of emotionally-tinged input: 1. continued practice in intervention techniques with hoped for assimilation of the processes involved, and 2. the acquisition of heightened sensitivity to the initial cues forecasting a negative response. Ultimately, the new construals of an event and the evocation of relaxation responses become more automatic. That is, a new more adaptive initial state can be realized via 'automaticity' following on the heels of one's volitional endeavors.

7.3 INITIAL STATES IN PSYCHOSOMATIC PROBLEMS

Among the population of patients investigated in the present study, there were essentially two initial states that were of concern; i.e., the physiological and psychological maladjustment. These patients all suffered from psychosomatic pain disorders.[2] Thus, one of the

intial states incorporated physiological responses that are presumed to have resulted in, or resulted from a psychological condition. Biofeedback therapy addresses physiological systems. It trains individuals to induce physiological changes which are incompatible with pathophysiological dysfunction.

In addition to pain disorders, these patients also presented with psychological maladjustment to their pain syndromes. Thus, the other initial state that proved to be of concern incorporated psychological responses that are presumed to have resulted in, or from a physiological dysfunction. Cognitive therapy addresses psychological systems and trains individuals to induce change in their emotional responsivity, with consequent change viewed as incompatible with pathopsychological dysfunction.

What was determined in the present study was that physiological and psychological processes function, not as separate entities, but as co-existant facets of the whole. Thus, for example, in the use of biofeedback therapy, we found that subjects who intervened in their physiological

[2] For all patients, the disorders had persisted for six or more months prior to their seeking biofeedback therapy and therefore these patients could also be classified as chronic pain patients.

response to stress (e.g., by inducing a relaxation response) decreased their pain and also decreased their general emotional negativity.

Importantly, we also determined that coupling physiological intervention with psychological intervention not only resulted in reduced pain and reduced emotional negativity, but actually served to 1) significantly reduce the negativity specifically experienced in conjunction with pain, 2) significantly enhance one's sense of self-esteem, 3) enhance one's sense of control and competency, 4) reduce the debilitating effects of negative emotions, and 5) reduce or eliminate pain to a significantly greater extent than that produced by biofeedback alone.

Before we re-examine the specific findings from the current study, I would like to re-address a basic premise upon which this investigation was founded. This premise states that physiological and emotional components of experience can serve as both complementary and antagonistic features of experience. That is, physiological changes can, and do influence the emotional network. Conversely, emotional changes can, and do, influence the physiological network. It was for this reason that Emotion-Scanning was devised as a

complementary tool to be used in conjunction with biofeedback therapy when dealing with pain patients.

Let us now briefly re-examine the findings derived from the present study; first in terms of the general improvements found across both treatment groups, and then in terms of the greater improvement found within the bf/emo scan group.

7.4 GENERAL IMPROVEMENTS ACROSS TREATMENT GROUPS

Both treatment groups demonstrated marked improvement over the course of therapy. Biofeedback therapy has been defined by the APA assigned Task Force on biofeedback therapy as "a treatment procedure that involves allowing a patient/client to interact directly with a device that informs the patient/client of the moment-by-moment state of some bodily function. The patient/client uses this information to bring about a change in the bodily function by some mental means for the purpose of relieving suffering or averting pathophysiological dysfunction" (Rickles, Onoda, and Doyle, 1982). The biofeedback task force further states that the "...treatment package of relaxation plus frontalis EMG plus autogenic phrases plus

home practice plus home charting is often enough to eliminate or reduce dramatically the frequency, duration, and intensity of tension headaches in many patients" (ibid).

Both of the treatment groups received all of the above plus additional training in alternative relaxation strategies, as well as more intensive charting techniques. This, for both groups, went far beyond mere monitoring of pain frequency, duration or intensity. Thus, it was not surprising to find therapeutic gain across both of the treatment protocols utilized in this study.

These findings can be summarized as follows:

1) Reductions over time of the EMG levels observed at the start of sessions.

2) Increases over time of peripheral temperature observed at the end of sessions.

3) Reductions in daily reports of anger, guilt, and anxiety over weeks of therapy, and reductions in reports of sadness over the first and second half of therapy.

4) Reductions over time in the reported incidences of uncomfortable striated muscle and heart activity associated with negative emotions.

5) Increases over time in the reported incidences of comfortable striated muscle activity associated with

positive emotions.

6) Reductions over time in both the episodic pain reports of 'pain intensity at its worst' and 'pain intensity at its least'.

7) Reductions over time in the reported duration of pain episodes.

8) Reductions over time in reported disability as a result of pain episodes.

9) Reductions over time in the reported intensities of anxiety, guilt, and sadness both before and during pain episodes.

10) Reductions over time in the reported intensity of anger experienced before a pain episode.

The above results represent substantial support for the use of biofeedback therapy, regardless of the presence or absence of an adjunctive technique. In fact, were we to consider the biofeedback group alone, this study would have much to contribute to the literature. This is because the major portion of biofeedback research has been devoted to the comparison of biofeedback instrumentation alone vs the teaching of relaxation techniques vs the use of home monitoring vs the combined use of relaxation plus positive pain-coping self-statements, etc.

In the design of the biofeedback protocol in the

present study, we were guided by the analysis of biofeedback research provided by the 1982 APA Task Force. This analysis makes a distinction between the use of biofeedback instrumentation as a tool, and biofeedback therapy which incorporates biofeedback instrumentation, relaxation training, home practice and home monitoring as part of a comprehensive treatment package -- a distinction which is too often ignored by researchers in the field, as well as by authors making comparative remarks about biofeedback and some other form of therapy.

7.5 IMPROVEMENT SPECIFIC TO THE BF/EMO SCAN GROUP

In turning now to the principal contribution of this investigator, i.e., Emotion-Scanning in conjunction with biofeedback therapy, one may profer the following:

> To assume that increased production of alpha band-width EEG rhythms, greater muscle relaxation, lowered blood pressure, or digital vasodilation will resolve all the psychological, social, and environmental antecedants of a psychophysiological symptom is at best naive. For the most part, biofeedback is a treatment of the symptom rather than of the etiology or underlying cause...other modalities of treatment must be included with the biofeedback training to enhance its effectiveness. (Rickles, et al., 1982).

This statement by the task force on biofeedback therapy stands in the forefront of the rationale for incorporating Emotion-Scanning therapy into the biofeedback therapeutic regimen. Emotion Scanning went beyond the symptom and addressed the cognitive, emotional, and physiological experience of the individual outside and apart from the experience of pain, per se. That is, an attempt was made to treat not merely the symptom (e.g., by teaching individuals to cope more effectively with pain), but an attempt was made to treat the underlying contributions and causes of the pain by teaching individuals to cope more effectively with their emotional experiences and the issues underlying their emotional upset.

7.5.1 Primum est, non nocere

From the onset in the formulation and utilization of this technique I was guided by the time-honored medical dictum -- "Primum non nocere", i.e., First, do no harm. In other words, if you can't help a patient, at least don't hurt him.

Emotion-Scanning in conjunction with biofeedback

therapy did not hinder the group's capacity for learning control over physiological systems compared with the bf group, as measured by frontalis EMG and digital vasodilation. In fact, in all respects, the use of Emotion-Scanning did no harm to the patients, but in many respects it did enhance their improvement.

Patients from the bf/emo scan group demonstrated significant gains over the bf group in regard to measures of general self-esteem, feelings of competency, loveableness, likeableness and overall feelings of identity and integration, as measured by the pre- and post-administrations of the SOSE.

On the pre-post measures of the PETS, the variance was too large to statistically combat the low power of the test resulting from a small N. Nevertheless, a nonsignificant tendency was found for improvement on the measure of general positivity, and greater gains on all the variables of the PETS were observed for the bf/emo scan group, compared to the biofeedback group, with the exception of the factor 'vigorousness'.

7.5.2 Pain and Emotion

The bf/emo scan group also demonstrated significant gains over the bf group in regard to their respective reports of pain-related emotions. Over time, the bf/emo scan group reported significantly less anxiety before and during pain episodes, less sadness before pain episodes, and less guilt during pain episodes.

These findings are important because they indicate a beginning capacity for these patients to detach their experience of discomfort from their emotions. I say "beginning capacity" because the total number of sessions received by these patients is quite short compared to the average number of sessions estimated for pain patients at pain centers. Our patients received one hour sessions one time per week for a total of 10 weeks, or about two and a half months of therapy. CARF approved pain centers, on the other hand, estimate a course of therapy to require three months, during which the patient is seen 2-3 times per week and within which the patient receives not only a variety of psychological intervention techniques, but receives physical and occupational therapies as well.

Given the severity of pain problems which were presented in the pain clinic employed in this study (and

compared to the amount of time allotted to therapeutic endeavors at pain centers), a total of 10 therapy sessions -- only four of which were specific to Emotion-Scanning therapy -- is minimal. Thus, the above findings are quite exciting, and I suspect that, had we had more time to investigate these patients, we would have found additional significant effects.[3]

The important point here is that the bf/emo scan patients are reporting significant decreases in pain-related emotional negativity. This is viewed as important in a couple of respects. First, and most obviously, the patient is suffering less during pain. It is bad enough to contend with discomfort, but when that discomfort is compounded with heightened emotional negativity it is as if the patient were suffering an insult added to injury.

In the area of pain management, it is well

[3] While this study was not designed as a comparative investigation of the relative merits of pain centers vs pain clinics, there is a cost-effective consideration worth noting. The average cost of therapy in our clinic is between $500.00 and $1000.00 per individual patient. The average cost of therapy at a CARF approved pain center is between $10,000.00 and $12,000.00 per individual patient. In these days of heightened medical costs, this is no small consideration.

substantiated that the degree of negativity in response to pain sensation affects the experience of pain itself (see, for instance, The Challenge of Pain, Melzack and Wall, 1982). The patient can get trapped within a 'Catch-22' situation in which the more negative one feels the more pain experience seems to predominate, and the more pain one feels the more negative one becomes.

Separating pain sensation from negative emotion promises then to serve an important therapeutic function. The patient should not only experience less emotional distress during pain, but should experience less pain as well! This is indeed what we found. The bf/emo scan group resported significantly less actual time spent in pain than the bf group.

Overall, we can say with some confidence, then, that the patients exposed to Emotion-Scanning, in addition to their normal course of biofeedback therapy, suffered less emotional turmoil in regard to their pain, and actually had less pain. Further they made note-worthy gains in their general positivity and significant gains in their feelings of competency, loveableness, likeableness, and integration.

The above represents statistical support for the use of Emotion-Scanning in conjunction with biofeedback

therapy in the treatment of psychosomatic pain disorders versus the use of biofeedback therapy alone. In addition to the above, there are some cogent clinical observations that merit attention. These observations deal with behavioral manifestations of enhanced benefits derived from the combined use of biofeedback and Emotion-Scanning therapy.

7.6 CLINICAL OBSERVATIONS

In the present study, questionnaire items were confined to examining individuals' perceptions and evaluations of pain and daily emotion. Changes in the actual behavior of individuals were not addressed. Nevertheless, (to capitalize on an adage), "action speaks louder than words", and in the bf/emo scan group adaptive behavioral action was found that was by no means matched by the bf group.

The following observations were not borne out by the statistical analyses of the data. Nevertheless, they are important because they directly reflect on the quality of daily emotional experiences as such experiences were communicated by the subjects in this study.

7.6.1 Positive Emotions

In regard to enhancing the experience of positive emotions, three out of the five bf/emo scan subjects acquired a greater capacity to experience and enjoy positive emotions. Two of these subjects actually reported the increases in terms of intensity ratings on their home monitoring charts.

The third patient did not change her intensity ratings of peak positive emotions in any systematic fashion. However, her increased capacity for enjoyment from life was well evidenced by the changes she made in her life. For instance, she gave herself permission to engage in more social activities, and she made the decision to get a job so that she could add more meaning to her life (as well as decrease some financial burdens that had been of concern). Further, she took an active role in changing the quality of communication which she had with her children.

As an example, in the early part of therapy (prior to the introduction of Emotion-Scanning), she complained that her son bought her flowers for her birthday. She complained bitterly that no one really cared for her and stated that if her son 'really cared' he would clean out

her garage instead of giving her flowers which reminded her of funerals.

Needless to say, the birthday party was less than successful and both the patient and her family wound up feeling angry and rejected. Of course, the patient was not really angry that her son had bought her flowers. She was actually angry and jealous that her son had been helping his ailing father-in-law with some labor and was temporarily less available to help her. However, at this point in time, the patient was unable to separate out for herself the various issues which were contributing to her feelings. As a consequence, she ultimately expressed irrational anger at the receipt of a gift and denied both herself and her family an opportunity to enjoy each other.

Eventually the patient began to deal more effectively with events and issues. She was less prone to evaluate her children's actions in terms of a mental tally sheet recording how much she did for them versus how much they did for her in return.

The same degree of willingness to open oneself up to positive experiences and affect positive change was not observed among individuals in the bf group.

7.6.2 Negative Emotions: Changing the Initial State

The control over negative emotions was also something that was ultimately manifested by the bf/emo scan group to a much greater degree than by the bf group. At times behavioral changes came about within a specific domain of a subject's life as a result of insight into his/her self-destructive means of construing certain kinds of events. "Insight" as used here is conceptually akin to a sudden acceptance of a new initial state.

As one patient remarked in regard to what she had previously received as a lack of sympathy from a significant other -- "You told me not to label myself as a 'pain patient' because I would [neglect all the positive parts] of my life. You said I'm a person who happens to have pain, not a pain person. So I kept telling myself what you said everytime I got [mad] until I finally realized that what I really was was a 'PAIN' - not a pain person or a person with pain, but a big pain in the ass!" (sic)

While this woman tended to state her ideas using less formal language than psychologists do, she was expressing insight into her own contribution to many of the interpersonal conflicts she had with her significant

other. She was attempting to communicate taking responsibility for her feelings of anger and, having accepted such responsibility she was in a better position to change the quality of her interpersonal communications.

7.6.3 The Plasticity of Negative Emotions

Primarily, the control over negative emotions took the form of remedial action after the onset and recognition of the negative emotional experience. The negative emotion actually served as a cue to initiate corrective responses.[4] Upon reflection, the use of negativity as a cue or signal for initiating adaptive change follows, in part, from the Emotion-Scanning protocol wherein patients first practiced emotional recall and then practiced cognitive re-formulation of the event.

Using negativity as a cue for initiating adaptive change follows, as well, from a need for the individuals to practice their techniques and become more comfortable

[4] Using adversive events as a cue to initiate corrective responses was also found among both groups in their control over critical moments of pain; e.g., muscle spasm often became a cue to initiate deep breathing techniques.

with the new construals they were attempting to apply to the situations and events they encountered. As previously stated, the first step in effecting change came from a conscious utilization of the learned techniques (both relaxation and cognitive re-formulation techniques) in the intervention of negative emotional sequences. This is not the same as aborting or negating a specific negative emotion, although intervention may abort, negate, or qualitatively alter further negative reactivity.

To better understand what I mean by this, I should like to refer back to Eptein's definition of a primary emotion. Epstein (1980) has conceptualized an emotion as a "complex, flexibly organized action tendency". In addition to the essential motivating characteristic of an emotion, he includes in his definition the components of receptivity, supportive physiological arousal, expressive behavior at times, and affective or feeling components.

Within this definition, there are two components that proved to be of especial concern within the population of patients dealt with in the present study -- (1) the supportive physiological arousal, and (2) the action tendency. In addition to the above, a final component of emotion which proved to be of primary concern in the present study is the dimension of pleasure/pain. It is

separate from emotion, and it is suggested that negative emotions are not necessarily painful.

7.6.3.1 Arousal, Action Tendencies, and Affective Pain

Biofeedback therapy provided all of the patients with a means of intervening in terms of the supportive physiological arousal of negative emotions. However, the pleasure/pain and action tendency components of emotions were only indirectly touched on by such physiological intervention.

For the majority of individuals in this study, negative emotions were accompanied by adversive or painful feelings. These adversive feelings appeared to be primarily a product of the fact that, while these individuals experienced a tendency toward action in response to negative emotions, they had no clear, adaptive form of action to take.

Behaviorally, this often took the form of passive-aggressive responses, or responses that alternated between passivity and aggressivity. For most of these patients, there was no middle ground.

I would suggest that the reason for the extreme forms

of reactions to negative emotions was related in part to the uncomfortableness of the emotion itself. In other words, most of the patients involved in this study felt uneasy with negative emotions and responded to their emotions by either denying their feelings altogether or by displacing them.

Once patients began to practice Emotion-Scanning techniques, the painfulness of negative emotions decreased and, as a consequence, many of them began to view negative emotions as less threatening. Those individuals who demonstrated skill at using cognitive re-formulation in their daily lives began to conceptualize negative emotions as motivators toward further action rather than as horrendous experiences to be avoided, denied, displaced, or somehow purged from their systems.[5]

Behaviorally, this change in attitude toward negative emotions was manifested in a number of ways. For one,

[5] On occasion, some patients actually communicated a heightened intensity of negative emotions for a time. The reason for this, I suspect, was because the patients allowed themselves to acknowledge their negative emotions -- as if giving themselves permission to feel badly. But at the same time that the patients communicated more intense negative emotions, one had the distinct impression that these emotions were less affectively painful.

many individuals became more assertive. As an example, one woman spent every working day conjuring up excuses to avoid having lunch with a co-worker who apparently devoted the lunch hour to an opportunity to malign the patient's boss. The patient stated that she basically liked the co-worker, but could not tolerate her incessant negativism. The conversations were quite distressing to the patient. However, the machinations she evolved for avoiding the woman proved to be even more distressing than the conversation, e.g., she would claim to have too much work and forfeit her own lunch hour, she would claim to have an appointment and essentially hide-out for an hour, she would displace her hostility and have a temper tantrum in the office (which served to 'scare-off' the co-worker), or she would develop a headache. An hour or more before lunch the patient would begin to develop her excuses in anticipation of the invitation to lunch, thereby creating a situation for herself in which the quality of her morning work began to suffer (which, in turn, affected her self-esteem).

With Emotion-Scanning therapy, the patient began to formulate constructive ways of dealing with the situation. She began to communicate her feelings to the co-worker without accusation or recrimination, and requested a

change in the co-worker's conversational behavior. Thus, she became more assertive in regard to communicating her own needs in this area.

Interestingly, her decision to deal more directly with the issue did not reduce her feelings of negativity, but it did change the 'quality' of her emotional distress. Rather than having anticipatory anxiety in regard to formulating and presenting her contrived excuse for the day and then feeling guilt because she was constantly lieing to her friend, she had anticipatory anxiety in regard to following through with her decision to be assertive. She then felt guilt because she "might have" hurt her friend's feelings.

In terms of behavioral implications, it can be said that her anxiety and guilt after Emotion-Scanning therapy were 'healthier' than the anxiety and guilt she communicated prior to Emotion-Scanning. Early forms of anxiety grew out of feelings of being trapped in a situation and the guilt grew out of her heavy reliance on telling lies to avoid an unpleasant encounter. Later forms of anxiety grew out of the felt risk that is inherent in change; i.e., her conscious decision to be assertive in the future. The volitional change in communication was, in the long run, constructive even

though it was uncomfortable.

In terms of her expressions of guilt, there is a qualitative difference between feeling guilt because one has violated a primary belief, or superego-constraint, which states that "lieing is bad!" versus feeling guilty as a result of one's sensitivity to the feelings of others.

Notice the difference in the pleasure-pain quality which is likely to be associated with each of the above forms of quilt. In the first case, the painful quality of the emotion is likely to be quite negative because the guilt is derived from a cognitive conclusion that "lieing is bad and I lied; therfore I am bad". In the second case, the painful quality of the emotion is likely to be less negative -- and may even be positive -- because the guilt is derived from a cognitive conclusion that "sensitive people don't like to hurt other people's feelings; Inasmuch as I realize that I may have hurt someone's feelings, I am a sensitive person".

7.6.4 Controlling Negative Consequences

Another behavioral manifestation of the enhanced

benefits of biofeedback plus Emotion-Scanning therapy over the relative merits of biofeedback therapy alone took the form of decreasing the debilitating effects of negative emotions. In a previous example, a patient was presented who stated that while he still felt initial anger in response to verbally-abusive casino customers, he no longer "carried" his anger with him as he dealt with others; i.e., he substantially reduced the amount of projection and displacement he had previously engaged in. Nor did he continue to lie awake at night feeling angry and frustrated as he ruminated about the unpleasant encounter. Succinctly put, he learned to 'let go' of unnecessary emotional distress. He 'let go' after the fact; i.e., he continued to automatically respond with anger to verbally abusive customers because he continued to automatically construe their comments in terms of a personal attack. Hence, in this particular area of the patient's life, he continued to experience initial anger. However, the debilitating effects of the initial anger were substantially reduced.

7.6.5 Averting Negative Emotions

On occasion, patients would communicate the integrated use of Emotion-Scanning and relaxation skills that actually served to avert the experience of unnecessary negative emotions. On the occasions of such control over potential negativity, the patient was normally quite sensitive to the (actual or possible) physiological and cognitive signals present. These signals served to forewarn the patient of the potential for needlessly responding in a negative fashion if appropriate intrapersonal intervention went unheeded. An interesting episode that was presented to me by one of the bf/emo scan patients will serve to elucidate the point.

In this instance, the patient was standing in line behind a man at the bank. The man was apparently angry and in a hurry. As the patient related the story, when the man reached the bank teller, she looked up at him and smiled politely. The man, on the other hand, refused eye-contact and said nothing. He shoved his papers at her, drummed his fingers and feet impatiently as he waited for the completion of his transaction and -- once completed -- grabbed his receipts and stomped out of the bank.

The patient then stepped forward, smiled at the teller and requested to cash a check. In response the teller said nothing, declined to make eye contact, grabbed the check to be cashed and busily went about completing the transaction with evident, ill-disguised annoyance. As the teller was stuffing the money into an envelope, she turned to a neighboring teller and stated, "I can't stand people who throw things at me!" (referring, of course, to the impatient man she had just recently encountered). In the midst of making the above statement, the teller roughly tossed the envelope of money in the direction of my patient. Only by happenstance did the patient prevent the envelope from flying to the floor (by virtue of the fact that her chest was resting against the counter and served as an obstacle to the 'flying moneyed missile').

The patient was quite enthusiastic about the event because as she watched the teller's emotional state change in response to the angry customer, she realized that the same kind of negative change could take place within herself if she had allowed herself to respond according to old patterns. The event served as an "ah-ha" experience in which the patient felt a meaningful integration of all the principles she had been practicing as part of her Emotion-Scanning and relaxation training.

C H A P T E R VIII

CONCLUSIONS

The null hypothesis that Emotion Scanning does not enhance the effectiveness of biofeedback therapy was disproven by the present study. Greater improvement occurred for the bf/emo scan group than the bf group. Some of the findings were statistically based and some were based on clinical judgement. All of the findings provide us with a better understanding of how Emotion Scanning functions when combined with biofeedback, and promote a greater understanding of the relationship between emotions and pain, in general.

A major conclusion arrived at in the present study is that Emotion Scanning does not necessarily alter the perceived intensity of daily emotions (at least, beyond that which is produced by Biofeedback therapy alone). However, the quality of the emotions did change as a consequence of the therapy.

This conclusion is based on clinical evaluation and judgement of the two groups in terms of behavioral changes which became manifested among bf/emo scan individuals after the introduction of Emotion Scanning therapy. It is

also based on the findings derived from the PETS and the SOSE. It will be recalled that the two groups did not differ from one another in regard to the PETS' post-test scores. On the other hand, they did differ in a statistically significant fashion in regard to the post-test scores on the SOSE.

Because the PETS assesses the frequency of various emotions and traits, whereas the SOSE assesses, as the name suggests, sources of self-esteem, this finding provides some insight into how Emotion Scanning functions within therapy. Biofeedback therapy in and of itself is sufficient to generally enhance the positive nature of individuals' emotions, just as biofeedback combined with Emotion Scanning does. However, Emotion Scanning appears to tap into another dimension of emotional experience which relates to the meaningfulness of emotions in terms of one's self-esteem. Whether positive emotions take on greater import, or negative emotions take on less, was not determined in a statistical manner. However, clinical judgements suggest that both proved to be the case for the bf/emo scan group.

In looking back at the assumptions presented earlier, it was stated that a primary function of emotions is that they serve to motivate the individual. It was also stated

that in evaluating the quality of an emotion, it is important to bear in mind the distinction between an emotion and the pleasure or pain associated with it. In the present study, two fundamental changes took place in relationship to these two assumptions.

First, most individuals in the bf/emo scan group ultimately accepted the view that negative emotions are not something to be avoided or denied. They began to look at emotions as sources of information about themselves and the world, and as potentially healthy motivators of human action. This served to make negative emotions much less threatening, and much less painful.

In addition, they became cognizant of options in regard to what Epstein has referred to as action tendencies. The tendency toward action inherent in any experience of emotion is well established. Broadly speaking, Horney's concepts of moving toward, moving against, and moving away from others is relevant. The direction of the tendency is defined, but of course the specific form of action within the tendency is not.

Thus, in response to an automatic evaluation of a situation that one is being (verbally) attacked, one is likely to experience anger and tend toward movement that is against (i.e., in opposition to) the offending party.

The pleasure or pain associated with the anger is likely to be a product of a number of factors.

1) One's belief about the emotion of anger:

If one believes that anger is a 'bad emotion', then the experience of anger is going to be associated with painful feelings.

2) One's cognizance of options relating to the form of action that can be pursued:

If an individual perceives himself or herself as having no options, or no options that would prove to be non-disruptive to a personal theory of reality (Epstein), then the pleasure-pain component of the emotion is likely to be negative.

3) One's awareness of intervention techniques in regard to the emotional experience:

If one does not have a means of intervening and dealing with the emotion, then the pleasure-pain quality of the emotion is less likely to change. This is not the same as having options in regard to specific actions. There are times in life when, in fact, there are no options in terms of changing the situation or event leading to an emotion. However, if an individual is aware of strategies for alleviating the impact of the emotion, the possibility of changing the pleasure-pain quality of the emotion is

enhanced. This may involve employing relaxation techniques, cognitive re-formulation, or both.

4) In line with the above, one must be willing to use the intervention techniques at his or her disposal. It is not enough to have an intellectual awareness of coping strategies. If an individual has either too much secondary gain from engaging an otherwise unpleasant negative emotion, or too little plasticity to incorporate new forms of coping responses, then the painful quality associated with the emotion is likely to remain unchanged regardless of the therapy employed.

Another conclusion arrived at in the present study concerns the fact that individuals are 'primed' to use therapeutic strategies in terms of their own goal-directed structures. Thus, even though the groups did not differ significantly in their intensity reports of daily emotions, they did significantly differ in terms of their intensity reports of pain-related emotions.

This finding is relevant to the third assumption presented earlier relating to the principle of initial states. As stated, initial states are both physiological and psychological in character. One basic initial psychological state that is inherent in all therapeutic endeavors is the patient's belief that the therapy will

(or will not) prove beneficial in overcoming difficulties. This belief, of course, serves as a filter through which therapeutic information is received.

For the most part, all of the patients in this study had a positive orientation toward therapy, and all of them used their therapeutic instruction in ways that were specific to alleviating pain problems.

An important aspect of initial states -- i.e., the interaction of the soma and the psyche -- was supported in the present study. Individuals whose training is confined to teaching them physical responses that are incompatiable with pain and generalized emotional stress experience a concomitant diminution of negative emotions (both daily and pain-related). Conversely, individuals, whose training consists of the above as well as teaching them cognitive responses that are incompatible with emotional distress and generalized pain experience not only a greater diminution of negative emotions, but actually experience less pain as well. Thus, this study offers further support for the conclusion that physical states influence emotional states, and emotional states influence physiological states.

In this regard, we are touching on the final assumption presented earlier which avers that initial

states are subject to change. Borrowing from physiology, we referred to this as the principle of plasticity. The patients in this study had essentially been caught within a "Catch-22" phenomenologic structure wherein they expereinced pain which lowered their threshold to negative emotions, and they experienced negative emotions which lowered their threshold to pain. With the advent of Emotion Scanning, the emotionally-generated action tendencies became individually clarified in regard to action strategies, thereby changing the pleasure-pain component of negative emotion. The initial reactivity state was also eventually changed so that over time the continued accrual of maladaptive responses was slowed, and often reversed.

REFERENCES

Averill, J. R. Emotions and anxiety: Sociocultural, biological and psychological determinants. In M. Zuckerman & C. D. Spielberger (Eds.), Emotions and anxiety: New concepts, methods and applications. New York: Wiley, 1976.

Bard, P. A diencephalic mechanism for the expression of rage, with special reference to the sympathetic nervous system. American Journal of Physiology, 1928, 84, 490-515.

Beck, A. T. Cognitive therapy and the emotional disorders. New York; International Universities Press, 1976.

Beecher, H. K. Measurement of Subjective Responses. New York: Oxford University Press, 1959.

Bouckoms, A. Recent developments in the classification of pain. Psychosomatics, 1985, 26, 637-645.

Brown, B. B. Stress and the art of biofeedback. New York: Harper and Row Publishers, Inc., 1977.

Budzynski, T. H. and Stoyva, J. M. An instrument for producing deep relaxation by means of analog information feedback. Journal of Applied Behavior Analysis, 1969, 2, 231-237.

Budzynski, T. H., Stoyva, J.M., and Adler, C. S. Feedback-induced muscle relaxation: Application to tension headache. Journal of Behavior Therapy and Experimental Psychiatry, 1970, 1, 205-211.

Budzynski, T. H., Stoyva, J. M., Adler, C. S., and Mullaney, D. J. EMG biofeedback and tension headache: A controlled outcome study. Psychosomatic Medicine, 1973, 35, 484-496.

Cannon, W. B. The James-Lange Theory of emotions: A

critical examination and an alternative theory. American Journal of Psychology, 1927, 34, 106-124.

Cannon, W. B. Neural organization for emotional expression. In M. L. Reymert (Ed.) Feelings and emotions: The Wittenberg Symposium. Worcester, Mass.: Clark University Press, 1928.

Cannon, W. B. Bodily changes in pain, hunger, fear and rage. New York: D. Appleton, 1929.

Cannon, W. B. The wisdom of the body. New York: W. W. Norton & Co., Inc., 1932.

Coyne, J. C. and Lazarus, R. S. Cognition, stress, and coping: A transactional perspective. In I. L. Kutash and L. B. Schlesinger (Eds.), Pressure point: Perspectives on stress and anxiety. San Francisco: Jossey-Bass. (in print)

Darwin, C. The expression of the emotions in man and animals. Chicago: University of Chicago Press, 1965.

Ekman, P., and Friesen, W. V. Unmasking the face. Englewood Cliffs, N. J.: Prentice Hall, 1975.

Epstein, S. The self-concept revisited, or a theory of a theory. American Psychologist, 1973, 28, 404-416.

Epstein, L. H., Webster, J. S., and Abel, G. G. Self-managed relation in the treatment of tension headaches. In J. D. Krumboltz and C. E. Thoresen (Eds.), Counseling methods. New York: Holt, Rinehart and Winston, 1976.

Epstein, S. Anxiety, arousal, and the self-concept. In I. G. Sarason and C. D. Spielberger (Eds.), Stress and Anxiety, Vol. 3, Washington, D. C.: Hemisphere Publishing Corp., 1976.

Epstein, S. The self-concept: A review and the proposal of an integrated theory of personality. In E. Staub (Ed.), Personality: Basic issues and current research. Englewood Cliffs, N. J.: Prentice Hall, 1980.

Epstein, S. A research paradigm for the study of personality and emotions. In Nebraska Symposium on

motivation: 1981. Nebraska: University of Nebraska Press, 1982.

Epstein, S. The unconscious, the preconscious, and the self-concept. In J. Suls and A. Greenwald (Eds.), Psychological perspectives on the self, Vol. 2. Hillsdale, N. J.: Erlbaum Associates, 1982.

Epstein, S. A research paradigm for the study of personality and emotions. In N. N. Page (Ed.), Personality: Current theory and research: 1982 Nebraska symposium on motivation. Lincoln: University of Nebraska Press, 1983.

Epstein, S. The Primary Emotions and Traits Scale. Unpublished scale developed at the University of Massachusetts, 1983.

Epstein, S. and Erskine, N. The development of personal theories of reality from an interactive perspective. In D. Magnusson and V. Allen (Eds.), Human development: An interactional perspective. New York: Academic Press, 1983.

Erskine, F. A. Utilization of biofeedback in general psychiatric practice. Paper presented at the N. J. Division of the American Biofeedback Society, Rutger's School of Medicine, N. J., June, 1983.

Erskine, N. Predicting the success of biofeedback therapy for migraine patients from MMPI Scales. Presented at the Annual Meeting of Midwestern Psychological Association, St. Louis, Missouri, 1980.

Fairley, P. The Conquest of Pain. New York: Charles Scribner's Sons, 1978.

Ford, M. R. Biofeedback treatment for headaches, Raynaud's disease, essential hypertension, and irritable bowel syndrome: A review of the long-term follow-up literature. Biofeedback and Self-Regulation, 1982, 7, 521-536.

Freud, S. Inhibitions, symptons and anxiety. (Translated by Alix Strachey), The Institute of Psycho-Analysis and Angela Richards, 1959.

Glueck, B. C. and Stroebel, C. F. Biofeedback and meditation in the treatment of psychiatric illnesses. Comprehensive Psychiatry,

1975, 16, 303-321. Hardy, J. D., Wolff, H. G. & Goodell, H. Pain Sensations and Reactions. New York: Hafner Publishing Company, 1967.

Hartman, L. M. and Ainsworth, K. D. Self-regulation of chronic pain: Preliminary empirical findings. Canadian Journal of Psychiatry, 1980, 25, 38-43.

Haynes, S. N., Griffin, P., Mooney, D., and Parise, M. Electromyographic biofeedback and relaxation instructions in the treatment of muscle contraction headaches. Behavior Therapy, 1975, 6, 672-678.

Holroyd, K. A., Andrasik, F., and Westbrook, T. Cognitive control of tension headache. Cognitive Therapy and Research, 1977, 1, 121-133.

Holroyd, K. A. and Andrasik, F. Coping and the self-control of chronic headache. Journal of Consulting and Clinical Psychology, 1978, 46, 1036-1045.

Holroyd, K. A. and Appel, M. A. A cognitive behavioral approach to psychophysiological disorders. In D. Meichenbaum and M. Jaremko (Eds.), Stress prevention and management: A cognitive behavioral approach. New York: Plenum Press, (in print).

Izard, C. E. Human emotions. New York: Plenum Press, 1977.

Jacobson, E. Progressive relaxtion: A physical and clinical investigation of muscular states and their significance in psychology and medical practice. Chicago: The University of Chicago Press, 1929.

Jacobson, E. Progressive relaxation: A physical and clinical investigation of muscular states and their significance in psychology and medical practice. (Rev. ed.). Chicago: University of Chicago Press, 1974.

James, W. The principle of psychology. Vol. II. New York: Dover Publication, 1980 (original edition by Henry Holt and Co., 1890).

Lazarus, R. S. Psychological stress and the coping process. New York: McGraw-Hill, 1966.

Lazarus, R. S. The self-regulation of emotions. In L. Levi (Ed.), Emotions: Their parameters and measurement. New York: Raven Press, 1975.

Lazarus, R. S., and Launier, R. Stress-related transactions between person and environment. In L. A. Pervin and M. Lewis (Eds.), Perspectives in interactional psychology. New York: Plenum Pub., 1978.

Marris, P. Loss and change. London: Routledge and Kegan Paul, 1974.

Melzack, R. and Wall, P. D. Pain Mechanisms: A new theory. Science, 1965, 150, 971-978.

Melzack, R. and Casey, K. L. Sensory, motivational, and central control determinants of pain: A new conceptual model. In D. R. Kenshalo (Ed.), Springfield, Illinois: Charles C. Thomas, Publisher, 1968.

Melzack, R. and Perry, C. Self-regulation of pain: The use of alpha feedback and hypnotic training for the control of chronic pain. Experimental Neurology, 1975, 46, 452-469.

O'Brien, E. & Epstein, S. The self-report inventory: Development and validation of a multidimensional measure of the self-concept and sources of self-esteem. O'Brien Doctoral Dissertation, 1980.

Parkes, C. M. Bereavement: Studies of grief in adult life. New York: International Universities Press, 1972.

Parkes, C. M. What becomes of redundant world models? A contribution to the study of adaptation to change. British Journal of Medical Psychology, 1975, 48, 131-137.

Pavlov, I. P. Conditioned Reflexes. Oxford: Milford, 1927.

Pavlov, I. P. Lectures on Conditioned Reflexes. New York: International Publishers, 1928.

Rickles, W. H., Onoda, L. and Doyle, C. C. Task Force

Study Section Report: Biofeedback as an adjunct to psychotherapy. Biofeedback and Self-Regulation, 1982, 7, 1-34.

Sainbury P., and Gibson, J. F. Symptoms of anxiety and tension and accompanying physiological changes in the muscular system. Journal of Neurology, Neurosurgery and Psychiatry, 1954, 17, 216-224.

Schachter, S. and Singer, J. E. Cognitive, social and physiological determinants of emotional state. Psychological Review, 1962, 69, 379-399.

Schneider, C. and Weiss, E. Manuel of biofeedback: Workshop for professionals. Denver, Colorado, Biofeedback Society of America, 1978.

Selye, H. The Stress of Life. New York: McGraw-Hill, 1956.

Selye, H. The Stress of Life. New York: McGraw-Hill.(rev. ed.) New York: McGraw-Hill, 1976.

Sherrington, C. S. Experiments on the value of vascular and visceral factors for the genesis of emotion. Proceedings of the Royal Society, 1900, 66, 390-403.

Spinelli, D. N. & Jensen, F. E. Plasticity: The mirror of experience. Science, 203, 75-78, 1979.

Spinelli, D. N. & Jensen, F. E. Plasticity experience and resource allocation in motor cortex and hypothalamus. In C. D. Woody (Ed.), Conditioning. New York: Plenum Publishing Co., 1982.

Sherrington, C. S. Cutaneous sensations. In E. A. Schafer (Ed.), Textbook of Physiology. Vol. 2. Edinburgh: Pentland Publishers, 1900, 920-1001.

Stoyva, J. Self-regulation and the stress-related disorders: A perspective on biofeedback. In D. Mostofsky (Ed.), Behavior control and modification of physiological activity. Englewood Cliffs, N. J.: Prentice-Hall, 1976.

Strickland, B. R. Levels of health enhancement: Individual attributes. In M. J. Mattarazzo, N. Miller, S. M. Weiss, and J. A. Herd (Eds.), Behavioral health:

A handbook of health enhancement and disease prevention. New York: Wiley & Sons, 1982.

Stroebel, C. F. Application of biofeedback technique in psychiatry. In Biofeedback: Task Force Report 19. Washington, D. C.: American Psychiatric Association, 1980.

Sweet, W. H. Pain. In J. Field (Ed.), Handbook of Physiology. Section 1: Neurophysiology. Washington, D. C.: American Physiological Society, 1959. Pp. 459-506.

Turk, D. C., Meichenbaum, D. H., and Berman, W. H. Application of biofeedback for the regulation of pain: A critical review. Psychological Bulletin, 1979, 86, 1322-1338.

Turk, D. C. Cognitive therapy for pain. New York: BMA Audio Cassettes, a division of Guilford Publications, 1980.

Turk, D. C., Meichenbaum, D. and Genest, M. Pain and Behavioral Medicine: A cognitive-behavioral perspective. New York: The Guilford Press, 1983.

Weber, E. S. P. The use of relaxation and biofeedback techniques in psychiatric practice. The Carrier Clinic Letter, 1977, 39.

Zimet, G. D. Locus of control and biofeedback: A review of the literature. Perceptual and Motor Skills, 1979, 49, 871-877.

APPENDICES

APPENDIX A

EMOTION-SCANNING RECORD

Name _____ Week of _____

Rate Emotions: 1 Mild 2 3 Moderate 4 5 Intense

Day	Loving, Affectionate	Worthy, Proud	Happy, Cheerful	Secure, Safe	Other (list)	Duration (in minutes)	Use space below to describe the event that produced your primary emotion. (Use additional paper if necessary.)	Use space below to record the automatic thoughts that produced your positive emotion.	Use space below to supply a response that would have changed your positive emotion into a negative emotion.

Day	Angry, Annoyed Displeased w/self, Guilty	Sad, Depressed	Frightened, Anxious	Other (list)	Duration (in minutes)	Use space below to describe the event that produced your primary emotion. (Use additional paper if necessary.)	Use space below to record the automatic thoughts that produced your negative emotion.	Use space below to supply a more constructive automatic thought than the one that produced your negative response.

Emotion-Scanning Record, page 2

Rate Intensity of Bodily Changes: 1 Mild 2 3 Moderate 4 5 Intense

Day	Muscular	Heart	Hand Temp.	Breathing	Other (list)	Use space below to describe in precise detail the bodily reactions that took place.	Use space below to provide any corrective responses that you used, or could use.

ay	Muscular	Heart	Hand Temp.	Breathing	Other (list)	Use space below to describe in precise detail the bodily reactions that took place.	Use space below to provide corrective responses.

PRIMARY EMOTIONS AND TRAITS SCALE

Instructions: How frequently do you have each of the following feeling Work rapidly, first impression are as good as any. The same item is never repeated, so there's no need to check for consistency. Please do not mark this form. Enter your answers on the opscan sheet provided, using the following scale:

1 ALMOST NEVER	2 OCCASIONALLY	3 SOMETIMES	4 OFTEN	5 NEARLY ALWAYS

1. sad
2. hopeless
3. alert
4. worthy
5. restless
6. hopeful
7. caring
8. charged-up
9. unreactive
10. angry-w-someone or-something
11. happy
12. at-ease
13. shaky
14. calm
15. pleased-w-self
16. weak
17. inhibited
18. loving
19. agitated
20. helpless
21. exhausted
22. conflicted
23. unspontaneous
24. lonely
25. cheerful
26. worried
27. peaceful
28. joyous
29. optimistic
30. disgusted-w-self
31. wide-awake
32. confused
33. energetic
34. gloomy
35. strong
36. suppressed
37. unconcerned
38. angry-at-self
39. annoyed-w-someone or-something
40. ashamed
41. organized
42. serene
43. capable
44. pessimistic
45. displeased-w-self
46. disgusted-w-someone-or-something
47. tired
48. frightened
49. unenthusiastic
50. guilty
51. unhappy
52. powerful
53. warm-hearted
54. bored
55. tense
56. depressed
57. jittery
58. relaxed
59. uninhibited
60. proud
61. disorganized
62. spontaneous
63. all-together
64. anxious
65. in-control-of-events
66. blue
67. friendly
68. furious
69. clear-minded
70. withdrawn
71. enthusiastic
72. weary
73. cooperative
74. irritable
75. fatigued
76. helpful
77. unexcitable
78. vigorous
79. resentful
80. disinterested
81. understanding
82. uncaring
83. efficient
84. good-natured
85. shy

APPENDIX C

Sources of Self-Esteem (SOSE) Inventory*

Part A: Please indicate how accurately the following items describe you. Mark all of your answers on the IBM sheet provided, do not make any marks on this form. Be sure to use a soft lead pencil (#2 or less).

Work as quickly as you can without making careless errors. It is best to rely on first impressions in answering each item. Use the following scale for your responses:

1	2	3	4	5
Completely False	Mainly False	Partly True and Partly False	Mainly True	Completely True

1. It is often hard for me to make up my mind about things because I don't really know what I want.
2. I nearly always feel that I am physically attractive.
3. I often fail to live up to my moral standards.
4. I am very well liked and popular.
5. In general, I know who I am and where I am headed in my life.
6. I nearly always feel that I am physically fit and healthy.
7. I am not easily intimidated by others.
8. No matter what the pressure, no one could ever force me to hurt another human being.
9. I don't have much of an idea about what my life will be like in five years.
10. On occasion, I have tried to find a way to avoid unpleasant responsibilities.

*Pre-publication draft (Form SM82). To be used only with written permission. Requests to use this inventory should be addressed to: Edward J. O'Brien, Department of Psychology, Bucknell University, Lewisburg, Pennsylvania 17837.

SOSE Inventory

1 Completely False	2 Mainly False	3 Partly True and Partly False	4 Mainly True	5 Completely True

11. I am usually a lot more comfortable being a follower than a leader.

12. I often feel that I lack direction in my life--i.e., that I have no long-range goals or plans.

13. I occasionally have doubts about whether I will succeed in life.

14. I am usually able to demonstrate my competence when I am being evaluated.

15. I usually do the decent and moral thing, no matter what the temptation to do otherwise.

16. I sometimes feel disappointed or rejected because my friends haven't included me in their plans.

17. I almost always have a clear conscience concerning my sexual behavior.

18. Most people who know me consider me to be a highly talented and competent person.

19. There are times when I doubt my sexual attractiveness.

20. I nearly always feel that I am better physically coordinated than most people (of my own age and sex).

21. There have been times when I felt ashamed of my physical appearance.

22. I have no problem with asserting myself.

23. I have trouble letting others know how much I care for and love them.

24. I occasionally worry that in the future I may have a problem with controlling my eating or drinking habits.

25. There are times when I have doubts about my capacity for maintaining a close love relationship.

SOSE Inventory

3

1 Completely False	2 Mainly False	3 Partly True and Partly False	4 Mainly True	5 Completely True

26. Sometimes it's hard for me to believe that the different aspects of my personality can be part of the same person.

27. There have been times when I have felt like getting even with somebody for something they had done to me.

28. I sometimes have a poor opinion of myself.

29. I feel that I have alot of potential as a leader.

30. I often feel guilty about my sexual behavior.

31. There are no areas in which I have truly outstanding ability.

32. Once I have considered an important decision thoroughly, I have little difficulty making a final decision.

33. In times of uncertainty and self doubt, I have always been able to turn to my family for encouragement and support.

34. The thought of shoplifting has never crossed my mind.

35. I feel that I don't have enough self discipline.

36. My friends almost always make sure to include me in their plans.

37. I usually feel that I am better looking than most people.

38. I have never felt that I was punished unfairly.

39. On occasion I have avoided dating situations because I feared rejection.

40. I am usually able to learn new things very quickly.

41. I have occasionally felt that others were repelled or "put off" by my physical appearance.

42. I seldom experience much conflict between the different sides of my personality.

43. I occasionally have had the feeling that I have "gone astray," and that I am leading a sinful or immoral life.

44. I am sometimes concerned over my lack of self control.

45. I am usually very pleased and satisfied with the way I look.

SOSE Inventory

	1 Completely False	2 Mainly False	3 Partly True and Partly False	4 Mainly True	5 Completely True
46.	I often feel torn in different directions and unable to decide which way to go.				
47.	There have been times when I intensely disliked someone.				
48.	There have been times when I have felt rejected by my family.				
49.	I have often acted in ways that went against my moral values.				
50.	It hardly ever matters to me whether I win or lose in a game.				
51.	People nearly always enjoy spending time with me.				
52.	There have been times when I have lied in order to get out of something.				
53.	I put myself down too much.				
54.	I occasionally feel that no one really loves me and accepts me for the person I am.				
55.	I have almost never felt the urge to tell someone off.				
56.	All in all, I would evaluate myself as a relatively successful person at this stage in my life.				
57.	There have been occasions when I took advantage of someone.				
58.	Most of the people I know are in better physical condition than I am.				
59.	I often give in to temptation and put off work on difficult tasks.				
60.	I nearly always have a highly positive opinion of myself.				
61.	I have difficulty maintaining my self control when I am under pressure.				

Go on to Page 5. Be sure to read the Directions for Part B before you proceed.

SOSE Inventory

5

Part B: In this section you are to describe how often you experience the thoughts and feelings described in each item. Use the following scale for your responses:

1	2	3	4	5
Almost Never	Seldom or Rarely	Sometimes	Fairly Often	Very Often

62. How often do you expect to perform well in situations that require alot of ability?

63. How often do you feel confident that you have (or someday will have) a lasting love relationship?

64. How often do you feel that others are attracted to you because of the way you look?

65. How often do members of your family have difficulty expressing their love for you?

66. How often do you feel dissatisfied with yourself?

67. How often do you wish that you were more physically attractive?

68. How often do you feel proud of the way that you stay with a task until you complete it?

69. How often do you feel a sense of vitality and pleasure over the way your body functions in physical activities?

70. How often do you feel that you are a very important and significant person?

71. Do you ever "stretch the truth" and say things that aren't completely true?

72. How often do you have trouble learning difficult new tasks?

73. When you are meeting a person for the first time, do you ever think that the person might not like you?

74. How often are you pleased with yourself because of the amount of self discipline and willpower that you have?

75. How often do you feel very certain about what you want out of life?

SOSE Inventory

6

	1 Almost Never	2 Seldom or Rarely	3 Sometimes	4 Fairly Often	5 Very Often
76.	How often do you feel self conscious or awkward while you are engaged in physical activities?				
77.	How often do you feel that you are more successful than most people at controlling your eating and drinking behavior?				
78.	How often are you complimented on your physical appearance?				
79.	How often does your body perform exceptionally well in physical activities, such as dancing or sports?				
80.	How often do you feel uncertain of your moral values?				
81.	How often do you feel really good about yourself?				
82.	How often do you feel in top physical condition?				
83.	How often do you feel that you can do well at almost anything you try?				
84.	Do you ever gossip?				
85.	How often do you feel able to openly express warm and loving feelings toward others?				
86.	How often are you able to exercise more self-control than most of the people you know?				
87.	How often do you feel clumsy when you are involved in physical activities?				
88.	How often do you feel conflicted or uncertain about your career plans?				
89.	How often do you lose when you get into arguments or disagreements with others?				
90.	How often do you feel highly satisfied with the future you see for yourself?				

SOSE Inventory 7

1 Almost Never	2 Seldom or Rarely	3 Sometimes	4 Fairly Often	5 Very Often

91. How often does your body feel "out of sorts" or sluggish?

92. How often do you gladly accept criticism when it is deserved?

93. How often do you (by your behavior) set a good moral example for others younger than yourself?

94. How often do you feel lacking in self-confidence?

95. Have you ever felt alone and unloved?

96. How often do you feel certain that people you meet will like you?

97. When you are involved in group discussions, how often do you feel that your ideas have a strong influence on others?

98. How often are you pleased with your sense of moral values?

99. Does it ever seem to you that some people dislike you intensely, that they "can't stand" you?

100. How often are you able to be assertive and forceful in situations where others are trying to take advantage of you?

101. When you go out with someone for the first time, how often do you feel that you are well-liked?

102. How often do you feel unattractive when you see yourself naked?

103. Have you ever felt that you lack the intelligence needed to succeed in certain types of interesting work?

104. Do you enjoy it when you are in a position of leadership?

105. How often do you feel that you are one of the more popular and likable members of your social group?

SOSE Inventory

8

1 Almost Never	2 Seldom or Rarely	3 Sometimes	4 Fairly Often	5 Very Often

106. Have you ever felt irritated when someone asked you for a favor?

107. How often do you feel that you are not as intelligent as you would like to be?

108. How often do people whom you love go out of their way to let you know how much they care for you?

109. How often are you able to resist temptations and distractions in order to complete tasks you are working on?

110. How often do you approach new tasks with alot of confidence in your ability?

111. How often do you feel uneasy when you are in a position of leadership?

112. Have you ever felt jealous of the good fortune of others?

113. How often do you have a strong influence on the attitudes and opinions of others?

114. How often do you enjoy having others watch you while you are engaged in physical activities such as dancing or sports?

115. How often is it hard for you to admit it when you have made a mistake?

116. How often do you feel highly satisfied with the way you live up to your moral values?

Name _____ PAIN CHART Week of _____

1. Day		1	2	3	4	5	6	7
2. No. in 24 hrs.								
Drug dosage								
3. Pain episode today: (if no, skip remainder)	Yes No							
4a. Intensity of pain at its worst (rate)	1 2 3 4 5							
4b. Intensity of pain at its least (rate)	1 2 3 4 5							
5. Duration of pain episode	minutes/ hours							
6. Degree of disability from pain (rate)	1 2 3 4 5							
7. Attempt to use office strategies to get relief	Yes No							
8. If yes, ability to control pain (rate)	1 2 3 4 5							
9. Additional pain episode(s) [If yes, give duration(s)]	minutes/ hours							

ITEM	SCALE
3 & 4	1 = mild 2 = mild to moderate 3 = moderate 4 = moderate to severe 5 = severe
6	1 = no interference 2 = some interference 3 = moderate interference 4 = much interference 5 = severe interference
8	1 = no success 2 = some success 3 = moderate success 4 = much success 5 = complete success

FEELINGS BEFORE and DURING PAIN EPISODE (BEFORE = B; DURING = D)

For each day you experience a pain episode, rate the scales on the back of this page for how you felt BEFORE and DURING the pain episode. The example below shows how one might rate a given day if he/she felt (a) neither secure nor frightened BEFORE a pain episode, but felt very anxious DURING; (b) felt neither happy nor sad either BEFORE or DURING the pain episode; (c) felt somewhat angry BEFORE and very angry During a pain episode; and (d) felt somewhat pleased-w-self BEFORE the pain episode and very DISPLEASED-w-self during the pain episode.

SECURE, UNTHREATENED, SAFE			B		D	FRIGHTENED, WORRIED, ANXIOUS
HAPPY, CHEERFUL, JOYOUS			B D			SAD, UNHAPPY, DEPRESSED
LOVING, AFFECTIONATE, KINDLY				B	D	ANGRY, ANNOYED, DISGUSTED
WORTHY, PLEASED-w-SELF, PROUD		B			D	DISPLEASED-w-SELF, ASHAMED, GUILTY

FEELINGS BEFORE and DURING PAIN EPISODE (BEFORE=B, DURING=D)

POSITIVE FEELING ←——NEITHER——→ NEGATIVE FEELING

DAY 1	SECURE, UNTHREATENED, SAFE	!	___	___	___	___	___	! FRIGHTENED, WORRIED, ANXIOUS
	HAPPY, CHEERFUL, JOYOUS	!	___	___	___	___	___	! SAD, UNHAPPY, DEPRESSED
	LOVING, AFFECTIONATE, KINDLY	!	___	___	___	___	___	! ANGRY, ANNOYED, DISGUSTED
	WORTHY, PLEASED-w-SELF, PROUD	!	___	___	___	___	___	! DISPLEASED-w-SELF, ASHAMED, GUILTY
DAY 2	SECURE, UNTHREATENED, SAFE	!	___	___	___	___	___	! FRIGHTENED, WORRIED, ANXIOUS
	HAPPY, CHEERFUL, JOYOUS	!	___	___	___	___	___	! SAD, UNHAPPY, DEPRESSED
	LOVING, AFFECTIONATE, KINDLY	!	___	___	___	___	___	! ANGRY, ANNOYED, DISGUSTED
	WORTHY, PLEASED-w-SELF, PROUD	!	___	___	___	___	___	! DISPLEASED-w-SELF, ASHAMED, GUILTY
DAY 3	SECURE, UNTHREATENED, SAFE	!	___	___	___	___	___	! FRIGHTENED, WORRIED, ANXIOUS
	HAPPY, CHEERFUL, JOYOUS	!	___	___	___	___	___	! SAD, UNHAPPY, DEPRESSED
	LOVING, AFFECTIONATE, KINDLY	!	___	___	___	___	___	! ANGRY, ANNOYED, DISGUSTED
	WORTHY, PLEASED-w-SELF, PROUD	!	___	___	___	___	___	! DISPLEASED-w-SELF, ASHAMED, GUILTY
DAY 4	SECURE, UNTHREATENED, SAFE	!	___	___	___	___	___	! FRIGHTENED, WORRIED, ANXIOUS
	HAPPY, CHEERFUL, JOYOUS	!	___	___	___	___	___	! SAD, UNHAPPY, DEPRESSED
	LOVING, AFFECTIONATE, KINDLY	!	___	___	___	___	___	! ANGRY, ANNOYED, DISGUSTED
	WORTHY, PLEASED-w-SELF, PROUD	!	___	___	___	___	___	! DISPLEASED-w-SELF, ASHAMED, GUILTY
DAY 5	SECURE, UNTHREATENED, SAFE	!	___	___	___	___	___	! FRIGHTENED, WORRIED, ANXIOUS
	HAPPY, CHEERFUL, JOYOUS	!	___	___	___	___	___	! SAD, UNHAPPY, DEPRESSED
	LOVING, AFFECTIONATE, KINDLY	!	___	___	___	___	___	! ANGRY, ANNOYED, DISGUSTED
	WORTHY, PLEASED-w-SELF, PROUD	!	___	___	___	___	___	! DISPLEASED-w-SELF, ASHAMED, GUILTY
DAY 6	SECURE, UNTHREATENED, SAFE	!	___	___	___	___	___	! FRIGHTENED, WORRIED, ANXIOUS
	HAPPY, CHEERFUL, JOYOUS	!	___	___	___	___	___	! SAD, UNHAPPY, DEPRESSED
	LOVING, AFFECTIONATE, KINDLY	!	___	___	___	___	___	! ANGRY, ANNOYED, DISGUSTED
	WORTHY, PLEASED-w-SELF, PROUD	!	___	___	___	___	___	! DISPLEASED-w-SELF, ASHAMED, GUILTY
DAY 7	SECURE, UNTHREATENED, SAFE	!	___	___	___	___	___	! FRIGHTENED, WORRIED, ANXIOUS
	HAPPY, CHEERFUL, JOYOUS	!	___	___	___	___	___	! SAD, UNHAPPY, DEPRESSED
	LOVING, AFFECTIONATE, KINDLY	!	___	___	___	___	___	! ANGRY, ANNOYED, DISGUSTED
	WORTHY, PLEASED-w-SELF, PROUD	!	___	___	___	___	___	! DISPLEASED-w-SELF, ASHAMED, GUILTY

APPENDIX E

REACTION CHART

Rate Emotions: 1 Mild 2 3 Moderate 4 5 Intense

Day	Loving, Affectionate	Worthy, Proud	Happy, Cheerful	Secure, Safe	Other (list)	Duration (in minutes)	Use space below to describe the event that produced your primary emotion. (Use additional paper if necessary.)

Day	Angry, Annoyed	Displeased w/self, guilty	Sad, Depressed	Frightened, Anxious	Other (list)	Duration (in minutes)	Use space below to describe the event that produced your primary emotion. (Use additional paper if necessary.)

Rate Intensity of Bodily Changes: 1 Mild 2 3 Moderate 4 5 Intense

Day	Muscular	Heart	Hand Temp.	Breathing	Other (list)	Use space below to describe in precise detail the bodily reactions that took place.

Day	Muscular	Heart	Hand Temp.	Breathing	Other (list)	Use space below to describe in precise detail the bodily reactions that took place.